NATUR CYMRU
Nature of Wales

Number/Rhif 56 • Autumn/Hydref 2015

- Limestone grasslands
- Dyfi Biosphere
- Natural gardening
- Dartford warblers
- Wentwood
- Zero-till farming
- Colliery spoil tips

Books, news, comment ...

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NATUR CYMRU CYNNWYS • CONTENTS

Golygyddol / Editorial 2-3
Ivor Rees

Zero-till and cover crops – the new agri-revolution • Mike Donovan ..... 4 - 8
Agricultural management focussed on looking after the soil

Lovely Dyfi – progress in the Biosphere • Andy Rowland ..... 9 - 13
Community involvement in the extended Dyfi Biosphere Reserve

Wentwood Forest revisited • Colin Titcombe ..... 14 - 17
The history and wildlife of this great Welsh forest

The limestone grasslands of north-east Wales • John Osley ..... 18 - 23
Colourful grasslands in beautiful landscapes

Spoilt rotten – the wonders of colliery spoil tips • Liam Olds ..... 24 - 28
The invertebrate wildlife of these rich and often overlooked habitats

Sefydliad Morgan Parry Foundation • Roger Thomas ..... 29 - 31
Hyrwyddo addysg a datblygu cynaliadwy / Advancing education and sustainable development

Weaving the web: towards a natural garden • Malcolm Berry ..... 32 - 37
A new approach to growing food and benefiting garden wildlife

Dartford Warblers in south Wales • Hannah Meinertzhagen ..... 38 - 41
A study of the habitat types favoured by this recent colonist of the Gower Peninsula

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NODWEDDION ARFEROL / REGULAR FEATURES

Green Bookshelf • Julian Hughes, David Saunders, James Robertson & Rowan McShane ..... 42 - 44

Discoveries in science • Bob Griffiths, Iwan Edwards & Barbara Brown 45
Spread of the New Zealand flatworm – a new citizen-science survey

Islands roundup • Ben Porter and Geoff Gibbs ..... 46 - 47
Rare migrant birds on Ynys Enlli / Bardsey Island this spring

Buglife • Steven Falk 48
Promoting spring forage for invertebrates

Woods and forests • Rory Francis 49
Saving the Celtic rainforest at Llenyrch

Life lines • Ben Wray ..... 50 - 51
Alien invasion on the Dee! The Chinese Mitten Crab

From the Garden • Bruce Langridge 52
A Welsh mycological revival

Glaswelltir calch: cor-rosyn cyffredin
Helianthemum nummularium
Limestone grassland: common rock-rose
Helianthemum nummularium

Stuart Smith

GOLYGYDDOL EDITORIAL

Mae ystyr rhai termau disgrifiadol wedi newid erioed drwy eu gorddefnyddio, gan arwain at ystumio. Pan fydd yn cael ei ddefnyddio yng nghyswllt adnoddau naturiol mae 'cynaliadwy' yn un o'r termau hynny. Roedd Morgan Parry, a fu farw ddwy flynedd yn ôl, yn hyrwyddwr brwd dros gynaliadwyedd yng ngwir ystyr y gair. Crëwyd sefydliad elusennol yn ei enw i annog hyn, yn ogystal ag i wella ac adfer amgylcheddau Cymru. Mae sawl erthygl yn y rhifyn hwn o *Natur Cymru* yn egluro'r union themâu hyn. Wrth drafod rhinweddau amaethyddiaeth 'dim trin', mae Mike Donovan yn ein hatgoffa o bwysigrwydd gweithio'n gynaliadwy â phriddoedd fel ecosystemau. Mae'r hen ddywediad sy'n honni 'fod yr ateb yn gorwedd yn y pridd' yn dal yn wir, hyd yn oed os llwyddodd lleiafrif gwrthwynebus i beri i'r UE wrthod y Gyfarwyddeb Fframwaith Pridd a fu yn yr arfaeth y llynedd.

Ar raddfa gardd - lawer llai, mae Malcolm Berry yn disgrifio'i arbrofi gyda phlannu cymysg a rhyngweithio â phlâu a bywyd gwyllt eraill, yn ogystal â chyflwr y pridd. Yng Nghoed Gwent, sy'n cael eu disgrifio gan Colin Titcombe, a gwelltiroedd calch Gogledd Ddwyrain Cymru, sy'n cael eu disgrifio gan John Osley, y cysylltiadau rhwng y ddaeareg sylfaenol a'r priddoedd sy'n bwysig. Yn achos y gwelltiroedd calch, mae'r mân wahaniaethau o ran pori – neu ddiffyg pori – yn hynod bwysig er mwyn cynnal y diddordeb blodeuegol. Er iddo barhau i gael ei gyfrif yn aml yn 'dir llwyd' ar gyfer dibenion datblygu, mae natur wedi adfer llawer o'r tomenni glo a fu unwaith yn hagru tirwedd De Cymru. Mae Liam Olds yn disgrifio diddordeb hanes naturiol y tomenni ac yn arbennig y pryfed sy'n elwa ar yr amrywiaeth gymhleth o gynefinoedd sydd yno. Gallai 'Gwasanaethau ecosystemol' fod yn derm arall sy'n cael ei ddefnyddio'n rhy barod, ond yn sicr mae'r ffaith fod natur wedi gwisgo'r tomenni wedi bod yn wasanaeth i'w werthfawrogi.

Ivor Rees

Some descriptive terms have always changed in meaning with overuse, leading to distortion. 'Sustainable', when applied to natural resources, is one of those terms. Morgan Parry, who died two years ago, was a great advocate for sustainability in the true sense. A charitable foundation has been set up in his name to encourage it, as well as the enhancement and rehabilitation of Welsh environments. Many of the articles in this issue of *Natur Cymru* illustrate the same themes. Discussing the merits of zero-till agriculture, Mike Donovan reminds us of the importance of sustainably working with soils as ecosystems. The old adage that 'the answer lies in the soil' still holds true even if a blocking minority caused the EU to abandon a proposed Soil Framework Directive last year.

At the much smaller garden scale, Malcolm Berry describes his experiments with mixed planting and interactions with pests and other wildlife, as well as soil conditions. In Wentwood Forest, described by Colin Titcombe, and the limestone grasslands of NE Wales, described by John Osley, it is the links between underlying geology and soils that are important. For the limestone grassland, the subtleties of the grazing – or the lack of it – are particularly important in maintaining the floristic interest. Though often still classified as 'brownfield' for development purposes, nature has rehabilitated many of the coal tips which once scarred the landscapes of South Wales. Liam Olds describes the natural history interest of the tips and particularly the insects exploiting the diverse complex of habitats. 'Ecosystem services' may be another term that is glibly applied, but nature clothing the tips has surely been a service to be valued.

Ivor Rees

Jason Johnson, USDA NRCS Iowa

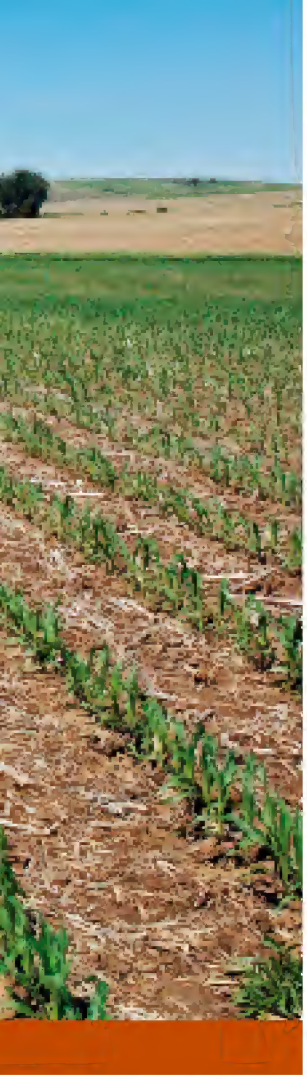
Zero-till and cover crops + the new agri-revolution

Corn begins to pop up through soybean stubble on an Iowa farm

Farmers across the globe are learning to work with nature rather than fight it. The biology of their soil is more important than the power of their machinery, and the benefits of their new approach are seen not only in the improvement of soil and an increase in wildlife but in their farm accounts. ***MIKE DONOVAN*** *explains the methods farmers are using to implement these new ideas.*

What actually is this stuff we call soil? We walk on it, drive over it, dig it, plough it, power-harrow it – but how does it work? In early 2013 I was writing an article on soil which ended up being titled 'Farming is Biology, not Chemistry', and there's nothing like writing about something to find out how much you don't know. I was genuinely surprised at my ignorance about soil. After all, I'd been farming for 25 years and spent about the same time as an agri-journalist. As a farmer I believed the soil issue was all taken care of - I sampled each field every three years, and the analysis came back with fertiliser recommendations which I generally followed. What more was there to do?

I knew about the problems of compaction, and made my own grass aerator in 1988 from a junked trailed mower – that improved production considerably. I ploughed some of the land each year, removing a worn-out ley and putting in some summer forage for the cows – Tyfon stubble turnips worked well. Another field might be done



later for grazing rye. My knowledge of soil was no more than was needed to do this work on my farm, and when I started *Practical Farm Ideas* magazine in 1992 it remained about the same, which was no more or less than that of my readers.

The magazine's objective is to provide farmers with innovative methods of cutting costs and improving efficiency. For many years I have been featuring adaptations and ideas that make cultivation less expensive, and these ideas quite often come from relatively large farms. For my article in 2013 I began to explore the benefits of zero tillage (also called 'no-till farming'), a way of growing crops or pasture without tilling the soil, and growing plants not for harvesting but for improving soil conditions.

Like most conventional farmers I couldn't understand the 'beard and sandals' brigade. For a start they made things so complicated, and then they were all hobby people with microscopic acreages. But researching the article showed me how wrong conventional farming has been: farming with nature can be successfully accomplished on large farms, with regular equipment, and it actually entails a lot less work. This in itself is interesting, as the one characteristic of organic farms is the greater input of labour required. But when conventional ploughing is replaced by zero-till, it amazingly does away with all the work of moving soil, and farmers who practise it tell me that they are letting the worms do the digging work.

Under zero-till, working the soil is neither necessary

Mike Donovan

Cover crop on 15 December 2014. The field would normally be ploughed and left to 'weather'. Conventional farmers see it as a field of weeds.

or desirable; in fact ploughing and cultivating damages it. Farmers have historically grown mustard and other green manures (ploughing plants back into the soil to enrich it), but the advance of chemical fertilisers has made them less important. Now these 'cover crops' are seen as the key to improving soils without using chemicals, and zero-tillers are saying "Why plough it in?" Leave the residue on the surface to protect the soil, let the worms drag the trash down, then drill the seeds of their cash crop through the residue.

The importance of worms

I became hooked. A US Department of Agriculture (USDA) video shows farmers being taught about soil. An audience member tentatively mentions the benefit of worms – "Now we're talking," says soil scientist Ray Archuleta. "Now we're looking at soil texture, at organic matter... we are looking at the space between the mineral particles that make up your soil. It's that space we need to protect and increase. That's the space which holds moisture, allows bacteria and fungi to grow, providing worms and other critters with food. That space should be alive, it feeds your plants. So how are we gonna do this?"

Ray talks about keeping the soil covered all the time, protecting it from the sun. Bare fields are warmed and the soil dries out. Cover plants, on the other hand, store sunlight as energy which can later be converted into a cash crop. "Make those plants a mixture so there's diversity. Use plants which fix nitrogen from the atmosphere, plants that have a

Mike Donovan

Healthy soil with good organic content smells sweet and earthy. It feels soft, moist, and friable, and allows plant roots to grow unimpeded.

huge canopy which will cover the soil when it comes to drilling, keeping the sun off the soil, providing food for worms and holding in moisture."

Changing to zero-till was not so difficult

The whole concept made sense and somehow made a nonsense of the heavy kit farmers are proud to use. But would it work in Britain? More calls and hours of Googling and I find a Staffordshire farmer with 3,000+ acres who converted to zero-till in 2010. He changed the farm overnight – the 450HP Cat Challenger was parked up, along with a series of big cultivators. He bought a used 4m John Deere 750A drill and a 6m John Dale drill as a back-up, and planted next year's crop directly into the stubble. The following year he decided to divide the farm, drilling half in the autumn and half in the spring after a winter cover crop. Spring crops had always been a gamble as they depended on getting timely rain: with the moisture locked in and cover plants providing a 'sun hat', all should be better. And it was. The winter cover supplied a mass of food and habitat for birds and insects, at the same time improving the soil. Just before drilling, the area was sprayed with glyphosate (Roundup), and the direct seeding reduced weed growth, including the dreaded blackgrass.

After 12 months the Challenger and all the cultivation equipment was sold. The farm is now run with just two 200hp tractors, and a single 6m John Deere. In the first year the diesel supplier called to ask why he had lost the business and was told about the cultivation change. Diesel for the big tractor and min-till formerly cost £20 per acre for crop establishment: with zero-till it is £3. The capital tied up in machinery is much less, and the cost of wearing parts is fractional. The savings are very large, and farm profitability moves up a gear.

Suitable for Wales

A handful of farmers in Wales are very successfully using zero-till, and in the summer 2015 issue of *Practical Farm Ideas* (issue 24-2) we had an in-depth report on a Pembrokeshire farmer who has direct-drilled cereal crops into pasture which hasn't been ploughed for 40 years. Direct drilling keeps the organic matter and the structure in place and holds moisture, all at a lower cost than normal. The system is particularly suitable for smaller Welsh farms because it needs fewer implements and there's no need for a big tractor.

Yet many farmers remain sceptical when they hear about it. Their land is too heavy (or sandy) their rainfall too high (or low), but in reality it works everywhere. Zero-till or true no-till is the system in Western Australia, much of Brazil, the norm in Paraguay, has 15% or so of US arable land and more in Canada. So why do we hear so little about it? Why is it hardly on the syllabus in colleges in the UK? Maybe we don't like change. Maybe we need to see our fields all brown and neat. Maybe we know we can make money using the tried and tested methods of our ancestors – provided we include the subsidy. There is so much to learn, and it is these pioneer farmers who are showing how it can be achieved.

Significant benefits to wildlife

When it comes to wildlife, there's no arguing that a bare field over the winter provides nothing for nature. Cover crops crossing whole fields not only feed birds and insects, they conserve soil and soil nutrients. Bare soil is easily eroded by rain and wind, and cultivation breaks up the soil structure built by all those worms. When I asked a Scots potato expert about the effects of de-stoning on worm populations, he told me under his breath that more than 90% of worms were killed. Which didn't surprise me. The power harrow does much the same.

USDA-ARS, Electron & Confocal Microscopy Unit, Beltsville, MD USA

Electron microscope photography reveals billions of soil micro-organisms in healthy soil, like the soil fungus seen here

No worms means less food, less biodiversity.

Leaving maize stubble over the winter is now not recommended, though many still do. Maybe they feel the need to work the ground before seeding, whereas in essence the job can be done directly onto stubble once the ruts have been ironed out, perhaps with a spring tine set at an inch or two, but just over the rutted area. There is no need to just sow rye or ryegrass. A mixture which includes some barley, mustard, vetches and phacelia, and maybe forage radish in frost free areas, provides a varied mixture of rooting patterns and crop heights. The crop will retain surplus nitrogen and prevent it leaching, hold soil, break pans and create biomass.

Ron Nichols, USDA NRCS North Carolina

The use of cover crops can significantly reduce costs, conserve the soil, and protect crops against drought.

Changing the farming mindset

We thought we knew how to farm. Soil was something which we broke, ripped and turned over in a process that required power. Macho, my Staffordshire friend, used to like his picture taken by the tracks of his Challenger or resting on the cultivator frame, and be dwarfed by them. Now you'll find him with a spade in hand, digging in fields looking at structure, soil life, checking the soil with fingers and nose - yes, healthy soil actually smells good while poor soil smells rank.

Farming with nature is so much cheaper and easier than battling against it, and so much more

Mike Donovan

Drilling winter wheat directly into cover crops sprayed with Roundup

interesting. The soil and wildlife benefit as well as your pocket and your lifestyle. That's not saying it's easy to do. Neighbours will tut-tut at your 'messy' fields. Will say it won't ever work. Others will tell you direct drilling was tried and failed in the '70s, they know all about it – so don't expect support from all quarters. But ultimately you'll get the benefits, for your soil will be improving while the neighbours' gradually declines. You're preparing your business for a time when subsidies are history, getting experience and learning from other progressives. Give it 20 years and what we now see as extraordinary may well be the norm, even in Wales! Farmers will need information by the bucket load and the the Soil + Cover Cropping section of Practical Farm Ideas aims to provide this, independently and without influence.

***Mike Donovan** is an agricultural economist and journalist who had a dairy farm in Carmarthenshire for 25 years. He found great value in the ideas and advice from other farmers, and started his all-editorial magazine* Practical Farm Ideas *so great innovations can be shared by all.*

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From left: Mustard, witches cover crop; made it myself tyre shifter; cover of current issue with 30 projects and report on Zambian farm opportunities; soil enriched by cover crops

Ecodyfi

Lovely Dyfi - progress in the Biosphere

View over Machynlleth to the south-east

*When we reported on the Dyfi Biosphere in 2009 (*Natur Cymru *33 pp18-21) the area had just been awarded its new, improved status by UNESCO. The accolade concerns cultural and built heritage as well as natural heritage, but here* **ANDY ROWLAND** *concentrates on how it can be used to encourage people to play more active roles in understanding, monitoring and caring for their environment.*

UNESCO (United Nations Education Science and Culture Organisation) is associated with a large number of sites, schools and University Chairs in Wales, most notably the six World Heritage Sites. Wales' only Biosphere Reserve is less well known than such World Heritage Sites as Blaenavon Industrial Landscape and Pontcysyllte Aqueduct and Canal, but it is quietly exploring new ways of bringing together the needs of people and the local economy with environmental imperatives – a 'learning site for sustainable development'.

Biosffer Dyfi Biosphere comprises the catchment area of the river Dyfi, with Machynlleth as its market town, Aberystwyth as the largest population centre and, in the sea, the southernmost tip of the Pen Llŷn a'r Sarnau Special Area of Conservation (SAC).

The estuarine unit of the Dyfi and its adjacent sea area form a unique complex of coastal wetland habitats including sub-tidal waters and sand banks, intertidal sediments, saltmarshes, shingle, sand dunes, raised

Ecodyfi

'Fresh and local' plant stall at Machynlleth market

bog, fen and reedswamp, fresh and brackish aquatic habitats, and woodland. Cors Fochno is a very rare and extensive example of raised mire (bog) developed in a coastal, estuarine floodplain location; the story of its safeguarding as a National Nature Reserve is described in *Natur Cymru* 54 pp38-42.

The estuary is one of the UK's best examples of a sandy, nutrient-poor estuary and is a nursery area for commercially important sea bass and mullet populations. Parts of the estuary and surrounding grazing marsh support the only regular wintering population of Greenland white-fronted geese in Wales or England (*Natur Cymru* 49, pp17-19).

Much of the Dyfi catchment has a moderately good cover of semi-natural broadleaved woodland (between 5 and 25ha or more habitat per 1km square). Coed Cwm Einion SAC is notable for its range of woodland types, especially its ash woodland with abundant small-leaved lime. The bryophyte and lichen floras of the valley woodlands are particularly rich. There are large numbers of species and communities of liverworts and mosses typical of remnant Atlantic woodlands; several of these are rare in the UK.

The river Dyfi and its many tributaries, farmland habitats and upland moorland add further to the biological diversity. This is exemplified by the catchment bird fauna, which contains 18 red status species, including black grouse, lesser spotted woodpecker, yellowhammer and lapwing. Twelve of the 17 UK species of bat are thought to occur here.

Biosphere Status

Biosphere Reserve status was originally given to the relatively small Dyfi estuarine unit in 1976, but at that time it was simply a badge for significant nature reserves. The UK left UNESCO in 1985, and by the time it re-joined in 1997 UNESCO had fundamentally changed the purpose of Biosphere Reserves. Each UK reserve (nine in all) had to decide whether to ask the UK Government to re-apply to UNESCO on its behalf, in order to join the World Network of Biosphere Reserves under the new 'people and place' or sustainable development criteria. In Dyfi's case, several years of public discussion led to an application in 2008, based on an expanded area and the new name of Biosffer Dyfi Biosphere, and the new accolade was awarded in June 2009.

What is a biosphere?

"Biosphere reserves are areas comprising terrestrial, marine and coastal ecosystems. Each reserve promotes solutions reconciling the conservation of biodiversity with its sustainable use.

Biosphere reserves are 'Science for Sustainability support sites' – special places for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity. They encourage collaboration, assess what is going on already, and then try to add value to that."

Unesco.org

The overall vision is that the Dyfi Biosphere will be recognised and respected internationally, nationally and locally for the diversity of its natural beauty, heritage and wildlife, and for its people's efforts to make a positive contribution to a more sustainable world. It will be a self-confident, healthy, caring and bilingual community, supported by a strong, locally based economy.

Collaboration

A guiding Partnership meets four times a year and convenes an open Annual Meeting, bringing together relevant public sector bodies with local business and community interests. As it has no staff or resources of its own, much of the action happens

through the partners or through thematic groups or networks. For example, the Education Group has brought many children into outdoor learning environments, and produced a 'Passport' learning tool and a set of site-based resources for school use.

Another active group is the Dyfi Biosphere Tourism Association, the only one covering the area. Working alongside the local authorities and supported by the development trust *ecodyfi*, it is a key player in developing and marketing the area as one of the 'destinations' supported by Visit Wales. The former Countryside Council for Wales, now part of Natural Resources Wales, improved and way-marked a set of 16 Rights of Way in the Dyfi Biosphere, and published guides to them under the brand Darganfod Dyfi. More recently, *ecodyfi* produced an e-brochure highlighting some of the key places to walk and watch wildlife, including the new 360° Observatory at Montgomeryshire Wildlife Trust's Cors Dyfi nature reserve, which is home to the Dyfi Osprey Project.

Three of the Dyfi Biosphere's objectives concern our relationship as individuals to the environment:

- To place a greater value on our natural environment and on Welsh language culture;
- To increase activity in nature conservation through voluntary means;
- To develop a more sustainable area, with residents and visitors choosing locally produced goods more often, and so reducing our impact on the world.

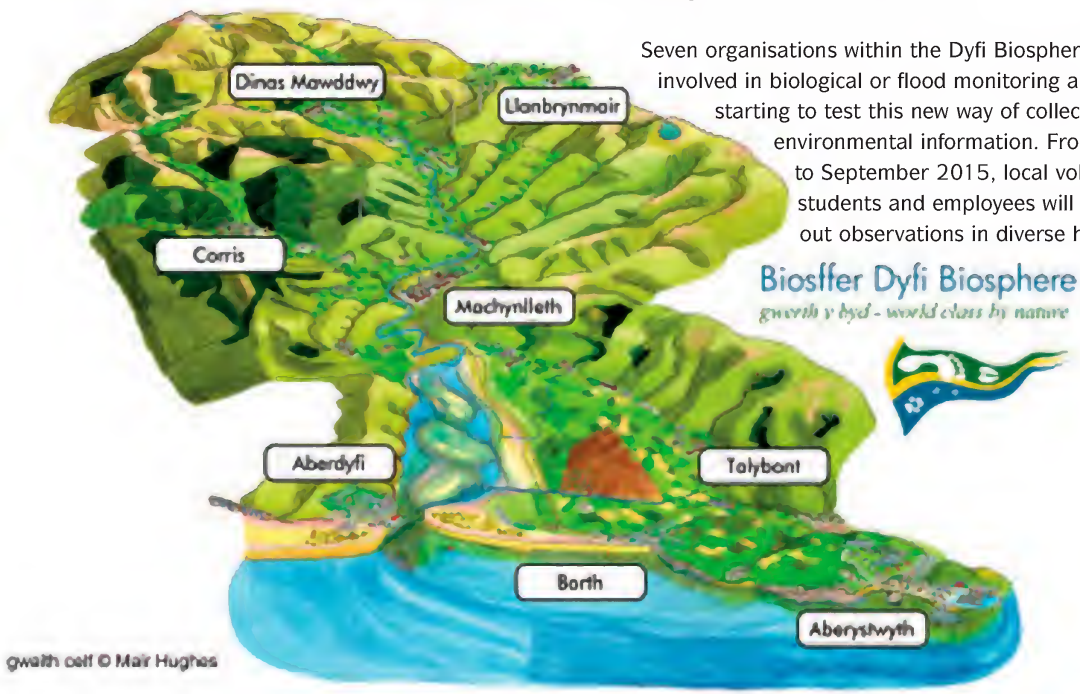
Ecological citizenship

Currently two initiatives being carried out in the Dyfi Biosphere aim to support such 'ecological citizenship'. Both are large research projects, with the Dyfi Biosphere providing case study material within the wider projects.

COBWEB observations

COBWEB (Citizens OBservatory WEB) is a four year project to develop a digital 'observatory framework' which will enable citizens to collect environmental information suitable for use in research, decision making and policy formation. Led by the University of Edinburgh, it is a consortium of 13 partners from five European member states. The Welsh members are Aberystwyth University, Environment Systems (an Aberystwyth-based environmental consultancy), *ecodyfi*, and Welsh Government.

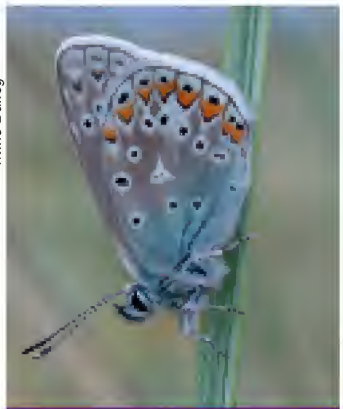
Seven organisations within the Dyfi Biosphere are involved in biological or flood monitoring and are starting to test this new way of collecting environmental information. From April to September 2015, local volunteers, students and employees will carry out observations in diverse habitats



Ecodyfi

Community wind turbine at Cilgwyn

Mike Bailey



Common blue *Polyommatus icarus*
Glesyn cyffredin

using smart phones and tablets. The software has the potential to increase the amount of recorded data and understanding about protected sites and other locations, while including the local community in this process.

The projects will use the app to meet their own objectives as well as testing the software infrastructure. For example, recording the occurrence of Japanese knotweed in Snowdonia National Park and comparing it to maps generated from aerial and satellite imagery will help to create a control strategy. Surveys of birds, bats and lizards by Coetiroedd Dyfi Woodlands, of butterflies at Pen Dinas Local Nature Reserve by Penparcau Forum, and of salt marsh reversion at RSPB Ynys-hir, will all help management planning.

Five of the projects, notably Ysgol Bro Hyddgen and Outward Bound Aberdyfi, are working with young adults and children to increase environmental awareness as well as recording data for wider use. It is hoped that the recording of dolphin sightings in Cardigan Bay will be less time consuming for Cardigan Bay Marine Wildlife Centre with this method, as well as being more engaging for the volunteer observers.

This first period of testing will lead to similar activity in Biosphere Reserves in Greece and Germany – and possibly in the Basque Country of Spain, where the Dyfi Biosphere is developing an overall collaboration agreement with the Urdaibai Biosphere Reserve.

Cymerau - thinking about water

When statutory bodies hold consultation events over issues like flooding or sea-defences, they are often poorly attended, even though these issues are very important to people's lives. Could there be a better way of informing, and being informed by local communities?

The second initiative sets out to do just that. Cymerau (confluence) is part of 'Hydrocitizenship', a three-year project that combines social science and arts practice research with community participation and creative activities. By asking what water means to us, as communities and individuals, Cymerau aims to research and document the themes that emerge and to develop the notion of citizenship in relation to water. While the project team is careful to avoid pre-judging what aspects of water people will want to talk about, climate change

Patrick Laverty

Looking across the Dyfi estuary to Aberdyfi town

is part of the context for this project, alongside fishing, hydropower and more playful activities.

Events linked to this theme in Ceredigion focus on the communities of Borth and Tal-y-bont, areas which have suffered significant flooding in the past, where academics, artists and community practitioners are working together to explore similar themes. Commissioned artists aim to evoke conversations and explore new and imaginative ways to think about water, working together to address contemporary issues and bring into awareness what it means to be an 'ecological citizen'.

Looking ahead

These two projects represent significant financial investment in the area, from the European Union's research programme FP7 and from the Arts and Humanities Research Council respectively. They illustrate the potential of the Dyfi Biosphere status to obtain funding and to foster collaboration. Less tangible benefits include an increased sense of pride and raised awareness of the area's cultural heritage.

Progress has been piecemeal because of the lack of core funding for the initiative, but a good start has been made. Current areas of attention are how to integrate the management of natural resources in the area, and how to monitor and adapt to environmental change. The Dyfi is one of three pilot areas where Natural Resources Wales is testing such an integrated approach, anticipating the statutory duty in the forthcoming Environment Bill (that will apply to the whole of Wales) to lead the development of an 'Area Statement'.

Those involved voluntarily in the Dyfi Biosphere will need to explore how to work effectively alongside this more formal process, helping with communication and delivery without being side-lined. Participation lies at the heart of Biosphere Reserves, bringing farmers, people who fish, foresters and conservationists into true collaboration to protect our common future. The Dyfi Biosphere embodies the long-term and lateral-thinking approach required by the new Well-being of Future Generations Act and seeks to deliver multiple benefits from its partners' actions.

Although trained originally as a biologist, ***Andy Rowland*** *has been working for sustainable community regeneration in the Dyfi valley since June 1998, as Manager of development trust* ecodyfi. *Before that, he spent 14 years at the Centre for Alternative Technology.*

Hyfrydwch Dyfi – cynnydd yn y Biosffer

Mae Biosffer Dyfi'n cynnwys dalgylch afon Dyfi a'r moroedd cyfagos. Mae cymysgedd cymhleth o gynefinoedd yn yr ardal gan gynnwys gweundir, coetir, ffermydd a chynefinoedd aber yr afon. Mae'n cynnal 18 o rywogaethau adar statws coch yn ogystal â llawer o fywyd gwyllt amrywiol arall. Rhai o amcanion y biosffer yw:

- gosod mwy o werth ar ein hamgylchedd naturiol ac ar ddiwylliant yr iaith Gymraeg;
- cynyddu gweithgaredd yng nghadwraeth natur trwy ddulliau gwirfoddol;
- datblygu ardal fwy cynaliadwy, gan gyflenwi nwyddau wedi'u cynhyrchu'n lleol ac felly lleihau'n heffaith ar y byd.

Mae dwy fenter yn cefnogi'r 'ddinasyddiaeth ecolegol' hon. Mae COBWEB yn anelu at alluogi pobl i gasglu gwybodaeth amgylcheddol gyda'u ffonau clyfar a'u tabledi. Mae dwy fantais i hyn, gellir casglu rhagor o ddata a daw pobl i ddeall ac i gyfranogi mwy ynghylch eu hamgylchedd naturiol. Mae Cymerau'n rhan o brosiect 3 blynedd i gael pobl i gymryd mwy o ran mewn rheoli dŵr drwy eu cynnwys wrth drafod materion megis newid hinsawdd, pysgota, ynni trydan dŵr a rheoli llifogydd, yn enwedig mewn ardaloedd lle ceir perygl o lifogydd.

Wouter Hagens

Wentwood Forest *revisited*

Traveller's joy (*Clematis vitalba* Barf yr hen ŵr) and a migrant painted lady (*Vanessa cardui* Mantell dramor)

In Natur Cymru *51, Barry Embling gave us a fascinating introduction to Wentwood Forest. Now* ***COLIN TITCOMBE*** *fills in more of the detail, based on his experience as a forester there 40 years ago. He describes the raven which went to the Tower, the dormice living in conifers and the insects encountered during day-to-day forestry operations.*

An early Wentwood was, but for the natural boundary of the River Wye, and the political boundary separating Wales from Mercia, a western extension of the Forest of Dean. It separated Upper Gwent (Gwent Uchaf) from Lower Gwent or Gwent-below-the-wood (Gwent Iscoed). Wentwood itself was the 'Wood of Gwent'. From Roman times into the Dark Ages it was dominated by native trees, mostly oak and beech, with the likes of wych elm, ash, wild cherry, birch and alder occurring plentifully where the underlying substrate was suitable.

The underlying geology

Geologically the Wentwood of today sits astride a ridge of Devonian sandstone (the Brownstones Group), but on its north-western edge the more calcareous St. Maughan's group marls (also of the Devonian) impinge to provide a suitable soil for field maple *Acer campestre*, ash *Fraxinus excelsior* and traveller's-joy *Clematis vitalba*. However, within the largely acidic sandstones there are seams of marl and cornstone (a calcareous conglomerate) which provide suitable soils for a scattering

of these species through much of the area as a whole. The more extensive Wentwood Forest of historic times was far more geologically diverse, and even included two pockets of volcanic rock, the only ones to occur in Gwent.

Ancient survivors

Over the centuries the tree cover of Wentwood has varied considerably. At times it has been almost entirely cleared, but some trees remained. Maps of the last century pin-point the positions of significant oaks – the Forester's Oak, Little Oak, Bluebell Oak and Curley Oak. The latter remains today, a hollow shell but, in part, still alive. In 2005 Coed Cadw, which at the time was preparing to purchase a large area of this ancient forest, commissioned a wildlife survey. During the course of this a species of fungus new to Wales was found growing on the Curley Oak. This was the oak polypore *Buglossoporus pulvinus*, although it was to be several years later that its identity was confirmed. A great rarity recorded on veteran oaks in six British counties, it has become extinct through most of its European range.

Jim Pitcher

Oak polypore *Buglossoporus pulvinus* on the inner hollow of the Curley Oak

Forty years ago

The Wentwood Forest I worked in was a much different place, compared to its mediaeval days. Although greatly reduced in size and largely dominated by introduced conifers, it nevertheless remained a habitat of great biological diversity. In part this diversity was due to a variety of ownership and management, all with different requirements and ideas. The resulting very mixed plantings included:

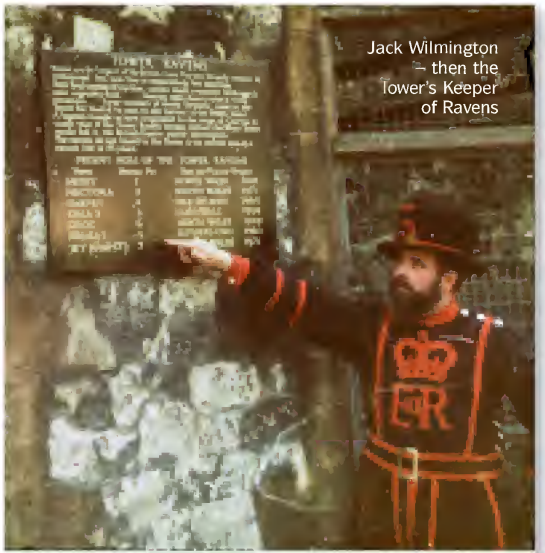
Colin Titcombe

Treecreeper (*Certhia familiaris* Dringwr bach) roosting in a Wellingtonia crevice

- various evergreen conifers as well as the deciduous larch which was dominant
- broad-leaved species including native oaks, beech and red oak from America
- experimental plots of southern beech (*Nothofagus*) in a few places

Birds of Wentwood

Barry Embling has described the breeding birds, including firecrests and hawfinches, in his *Natur Cymru* 51 article. In winter, several species make use of Wellingtonias *Sequoiadendron giganteum* around Wentwood Lodge, the Duke of Beaufort's centre of operations in the Forest. The thick soft bark on the trunks of these trees provides roosting niches for wrens, coal tits and treecreepers. In addition to crossbills and siskins, redpolls and goldfinches feed among the conifers, especially in the late winter/early spring period when the larch trees in particular can hold large flocks of these species. In Wentwood, as in other similar forests, evergreen conifers are used by many birds for roosting. These include hawfinches and the winter thrushes – redwings and fieldfares.


Jack Wilmington – then the Tower's Keeper of Ravens

The raven Wentwood Jet

In 1971 one of Wentwood's ravens found its way to the Tower of London. While survey work for the first Atlas of Breeding Birds of Britain and Ireland was underway, an orphaned raven was found close to its nest-site, with one of the parent birds lying dead beneath the tree. Since no sign of the other parent was apparent, and the youngster was keen to take any food on offer, it was decided to take the waif into care. Unfortunately this led to imprinting, and so the raven was offered to the Tower of London. 'Wentwood Jet', as the young bird was named, joined the Tower Ravens as a 'guest' in July 1971.

Mammals and insects

Among the mammals may be mentioned the recent re-establishment of the roe deer, seemingly by natural expansion, and the widespread occurrence of the dormouse. During my time in Wentwood dormice were found in all parts of the Forest, even in stands of maturing conifers (c. 30-40 years old). As we worked in the Forest we encountered them in nests situated in Norway spruce and Lawson cypress, at varying heights above the ground. More commonly, however, they were found during clearing operations in young plantations, secreted in their nests in broom or bramble bushes.

Insects too were found to be of great variety here. During the 1960s and 1970s the local lepidopterist Dr. Neil Horton compiled a list of some 334 moths

Colin Titcombe

Dormouse *Muscardinus avellanarius* Pathew

Holger Gröschl CCA-SA 2.0 Germany

Horn-tail *Urocerus gigas*

Colin Titcombe

The eyed ladybird *Anatis ocellata*

Some of the many invertebrate species found in Wentwood

Silver-washed fritillary *Argynnis paphia* Britheg arian

Purple Hairstreak *Thecla quercus* Brithribin porffor

White-letter Hairstreak *Strymonidia w-album*

Dingy Skipper *Erynnis tages* Gwibiwr llwyd

Coxcomb Prominent *Lophoteryx capucina* Crwbach cribog

Emperor moth *Saturnia pavonia* Ymerawdwr

Fox moth M*acrothylacia rubi* Gwyfyn y cadno

Clouded Buff *Diacrisia sannio* Ermin melyn

Wood Tiger P*arasemia plantaginis* Teigr bach

Broad-bordered Yellow-underwing *Lampra fimbriata* Isadain felen amryliw

Southern Wood Ant *Formica rufa* Morgrugyn coch

Four-spotted Clytra Beetle *Clytra quadrifasciata*

Bee-beetle *Trichius fasciatus*

Longhorn Beetle *Strangalia quadrifasciata* Chwilen gorniog

Glow-worm *Lampyris noctiluca* Pryf tân

Eyed Ladybird *Anatis ocellata*

Andreas Eichler CCA-SA 4.0 International

Silver-washed fritillary *Argynnis paphia* Britheg arian

and butterflies in the Forest. In the latter decade of the period I also encountered many invertebrate species during day-to-day work.

Larch and the 'larch-fly'

Probably the most ecologically important of the commercial conifers is the larch, a species with both fungal and invertebrate associates. The recent arrival of *Phytophthora ramorum* in the forest is, therefore, especially regrettable. In response to this both Coed Cadw and Natural Resources Wales have been felling large areas of larch plantation and this will have an effect on many species including the spectacular horn-tail *Urocerus gigas* and its parasitic associate, the large ichneumon *Rhyssa persuasoria*. Although the horn-tail will lay its eggs into conifer wood in general, it does seem to have a bias for the larch, hence the forest-workers' name for it of 'larch-fly'.

Colin Titcombe *has been an enthusiastic naturalist in Gwent all his life, and has published two books on its wildlife. From 1970 to 1982 he worked as a Forest Craftsman in Wentwood Forest.*

Coed Gwent

Flynyddoedd maith yn ôl, roedd Gwynllŵg yn estyniad o Goedwig y Ddena ac yn cynnwys coed llydanddail brodorol, yn bennaf. Heddiw mae'n tyfu o boptu cefnen o dywodfaen Defonaidd, ond yn hanesyddol roedd yn fwy amrywiol. Mae'r gorchudd coed wedi amrywio'n arw dros y canrifoedd, ar adegau roedd bron iawn wedi clirio'n llwyr a dim ond rhai coed hynafol ar ôl. Mae mapiau'n dangos yn union lle'r oedd coed derw o bwys: mae'r Dderwen Gyrliog wedi goroesi ac yn cynnal y ffwng prin *Buglossoporus pulvinus*, rhywogaeth sydd wedi diflannu o'r rhan fwyaf o'i chynefin yn Ewrop.

Ddeugain mlynedd yn ôl, y coed conwydd a gafodd eu plannu yno oedd i'w gweld yn bennaf, ond, er hynny roedd y goedwig yn amrywiol yn fiolegol, gyda choed llydanddail yno, llawer o adar coetir, y pathew a nifer o infertebratau, gan gynnwys 334 o rywogaethau gloÿnnod byw a gwyfynod. Mae cigfrain yn byw yma hefyd ac ymunodd un aderyn amddifad â'r cigfrain yn Nhŵr Llundain.

David Parker

The limestone grasslands of north-east Wales

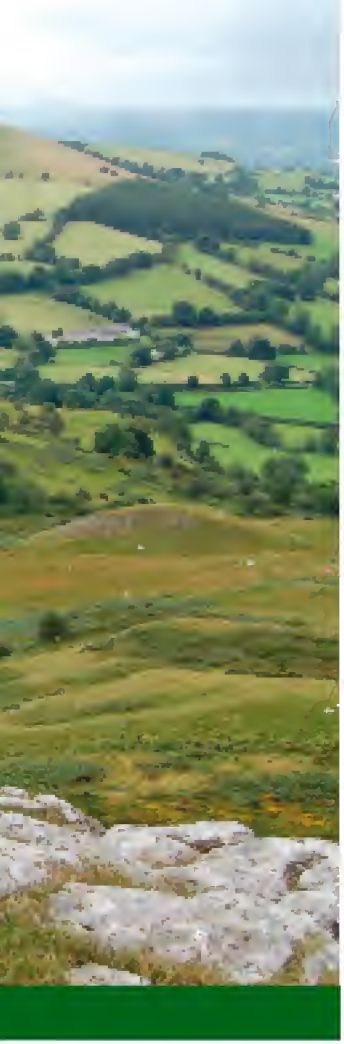
Looking west from the limestone pavement at Bryn Alyn towards the Vale of Clwyd

The species-rich grasslands of the north-east Wales limestone are a highlight of the Welsh flora. Here ***JOHN OSLEY*** *describes the limestone country, the types of grassland, the plants and where you can see them.*

The grasslands on the thin limestone soils of north-east Wales are not only beautiful but are of high nature conservation value, as they represent distinctive semi-natural plant communities containing many species of grasses, sedges and herbs. Some of these are rare not only in north-east Wales but also in the UK. They survive because they continue to be grazed and have not been improved for increased agricultural production through reseeding or the addition of artificial fertilisers.

Origin of the grasslands

The calcicolous (lime-loving) grasslands occur on soils derived from Carboniferous Limestone which was formed in warm, shallow tropical seas during the Carboniferous period, some 300 million years ago. This sedimentary rock was subjected to only a little folding or faulting and today's familiar landscape of terraced cliffs and escarpments reflects this. Exposures of the limestone are in two almost parallel arcs either side of the rift valley that is the Vale of Clwyd. The western arc extends



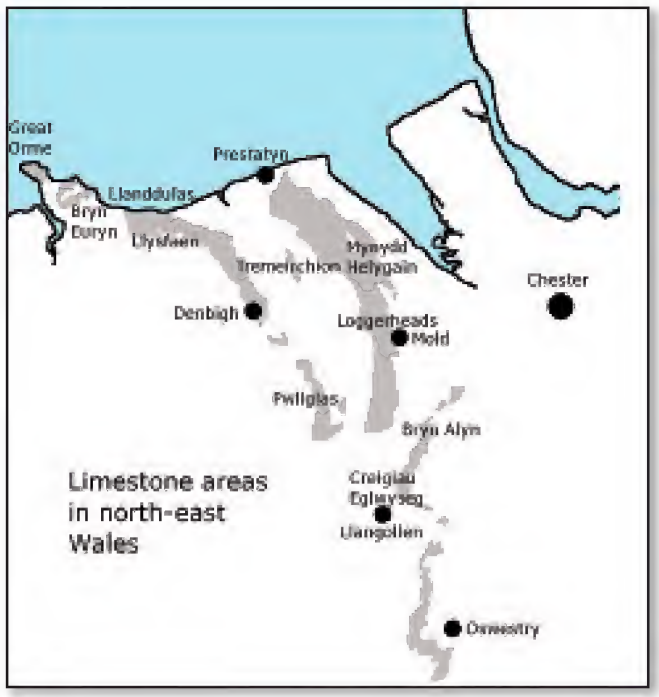
along the coast from Colwyn Bay to Abergele and then inland southwards to beyond Denbigh and south-west of Ruthin. The eastern arc extends from Prestatyn on the coast inland to Mynydd Helygain (Halkyn Mountain) and thence southwards to the spectacular Creigiau Eglwyseg escarpments and screes overlooking Llangollen.

Over millennia rainfall and frost opened fissures in the bedrock making it free-draining, and also producing extensive screes of rock fragments below cliffs. During the last Ice Age, when north-east Wales was buried deep beneath upto 300 metres of ice and glaciers, the surface of the limestone exposures was scraped flat. Later erosion produced a pattern of limestone blocks and crevices known as limestone pavement. The blocks were often removed to build the dry stone walls that enclose the grasslands today. The alkaline soil derived from limestone bedrock is rarely more than 30-40 centimetres deep and is often much less as it is usually in close proximity to rock outcrops.

The species composition of the grasslands on these shallow soils is significantly influenced by summer drought, and species that establish a deep tap root, such as the rock-roses *Helianthemum* species and common bird's-foot-trefoil *Lotus corniculatus*, are favoured. Other climatic factors affecting the vegetation include exposure to wind and freedom from hard frosts. Drought may also contribute to slowing the invasion of shrubs and trees when livestock grazing is reduced. The absence of species such as spring squill *Scilla verna* indicates that salt spray has little influence on the grassland communities, even those closest to the coast.

Lenses of glacial till (boulder clay) or wind-blown sand (loess) derived from nearby foreshores either overlie the limestone bedrock or occupy the shallow valleys between parallel low ridges of limestone rock exposures. These deposits add diversity by providing soils for calcifugous (lime-hating) grassland and heath communities. However, these deeper easily worked soils are more likely to be agriculturally improved, thereby leading to species impoverishment.

The grasslands are maintained by their use as permanent pasture grazed by livestock, usually sheep and, less frequently, cattle or horses. Where livestock grazing is abandoned rabbit grazing can maintain the grasslands in an open condition. However, if a rabbit population decline coincides



Stuart Smith

CG1: Hoary rock-rose *Helianthemum oelandicum* Cor-rosyn lledlwyd

Stuart Smith

CG1: Spiked speedwell *Veronica spicata* Rhwyddlwyn pigfain

with an extended period of no, or little, livestock grazing, then the grasslands can rapidly fall into the grip of invasion by gorse, thorn scrub or woodland, which is difficult to reverse. This can lead to a total loss of grassland to species-poor scrub thickets of common gorse *Ulex europaeus*, hawthorn *Crataegus mongyna* or blackthorn *Prunus spinosa*, or broadleaved woodland dominated by either ash *Fraxinus excelsior* or sycamore *Acer pseudoplatanus*.

A rare habitat

North-east Wales covers the old administrative counties of Denbighshire and Flintshire (Watsonian vice-counties 50 and 51 respectively). These cover some 250,000 hectares with less than 10% of this underlain by Carboniferous Limestone, and much of this is covered by deposits from the last Ice Age which produce soils unsuitable for lime-loving plants. The result is that soils derived from lime-rich bedrock occupy only about 1,250 hectares. About half of this area is a mosaic of gorse and thorn scrub and deciduous woodland (some representing losses of grasslands where grazing has ceased) and extensive limestone quarries. In the second half of the 20th century large limestone quarries caused significant losses of calcicolous grassland through direct removal of habitat.

Of the remaining 600 hectares, the deeper soils have usually been agriculturally improved, sometimes by the application of farmyard manure alone, but more often by the application of herbicide followed by cultivation and re-seeding with productive grasses and clovers and the application of artificial fertilisers. This results in productive grassland that can support many more livestock but is extremely species-poor. The remaining area of calcicolous grassland communities in north-east Wales totals less than 300 hectares distributed across 30 sites.

Types of grassland

Our detailed knowledge of the grasslands is as a result of national surveys undertaken in the 1990s by the Countryside Council for Wales (CCW): the 'Phase 1' habitat survey and the more detailed 'Phase 2' lowland grassland survey[1]. From the Phase 1 survey approximately 80 sites were selected in north-east Wales for 'Phase 2', which were subject to detailed survey using the National Vegetation Classification (NVC)[2]. This study found that six calcicolous grassland (CG) communities (CG1, CG2, CG3, CG6, CG7 and CG10) and 10 sub-communities are present in north-east Wales.

On the steepest slopes amongst rock outcrops on the rockiest and thinnest soils is the **sheep's fescue *Festuca ovina*–carline thistle *Carlina vulgaris* grassland (CG1)**. This is a short open turf containing sheep's fescue, crested hair-grass *Koeleria macrantha* and quaking grass *Briza media*, with wild thyme *Thymus polytrichus*, salad burnet *Sanguisorba minor,* carline thistle and common rock-rose *Helianthemum*

nummularium. At the coastal sites of Bryn Euryn, Llanddulas, Graig Fawr, Prestatyn Hillside and Moel Hiraddug are rare species such as hoary rock-rose *Helianthemum oelandicum*, Nottingham catchfly *Silene nutans*, spring cinquefoil *Potentilla neumanniana*, dark-red helleborine *Epipactis atrorubens*, white horehound *Marrubium vulgare*, dwarf mouse-ear *Cerastium pumilum*, wild cabbage *Brassica oleracea* and juniper *Juniperus communis*. Spiked speedwell *Veronica spicata ssp. hybrida* occurs in this community at several of the coastal sites but is also found further inland if competition from taller herbs and grasses is not too great.

At the coastal sites mentioned above and those further inland – for example at Cefn, Y Graig, Tremeirchion, Gop Hill, Trelawnyd, Mynydd Helygain and its adjacent grasslands, Loggerheads and Bryn Alyn – where slopes are less steep with deeper and less rocky soils, and where sheep and rabbit grazing is maintained, **sheep's fescue–meadow oat-grass *Avenula pratensis* grassland (CG2)** is the most extensive grassland community. Grasses and sedges in this closed turf include sheep's fescue, crested hair-grass, quaking grass, common bent *Agrostis capillaris*, spring sedge *Carex caryophyllea* and glaucous sedge *Carex flacca*. Herbs remain prominent, with common rock-rose, salad burnet, wild thyme, common bird's-foot-trefoil, lady's bedstraw *Galium verum* and harebell *Campanula rotundifolia* being the most frequent of the many species present.

Stuart Smith

CG3: Upright brome *Bromopsis erecta* Mynydd Marian

At some inland sites this community has an unusual variant that also contains betony *Stachys betonica*, common knapweed *Centaurea nigra*, devil's-bit scabious *Succisa pratensis* and oxeye daisy *Leucanthemum vulgare*. A rich variety of uncommon species present includes frog orchid *Dactylorhiza viridis*, fragrant orchid *Gymnadenia conopsea*, early-purple orchid *Orchis mascula*, pyramidal orchid *Anacamptis pyramidalis*, green-winged orchid *Anacamptis morio*, mountain everlasting *Antennaria dioica*, adder's-tongue *Ophioglossum vulgatum*, moonwort *Botrychium lunaria* and stemless thistle

Stuart Smith

CG2: Lady's bedstraw *Galium verum* Briwydd felen

Stuart Smith

Nutrient-poor wild thyme CG7 grassland at Eyarth

Cirsium acaule, the latter being very rare in north-east Wales. Where grazing has ceased in Loggerheads Country Park, stands of the unusual **bloody cranesbill Geranium sanguineum–lesser meadow-rue *Thalictrum minus* grassland (an extreme form of CG2)** are present.

Agricultural improvement modifies the sheep's fescue–meadow oat-grass grassland so that grasses such as crested dog's-tail *Cynosurus cristatus*, yellow oat-grass *Trisetum flavescens* and perennial rye-grass *Lolium perenne* increase at the expense of the herbs. A similar impoverishment can also arise as a consequence of trampling at sites popular with the general public. Mynydd Helygain has soils contaminated with lead, zinc, cadmium and copper from mining and smelting. These provide a favourable habitat for extensive stands of spring sandwort *Minuartia verna*. Smaller populations are present at Trelogan, Graig Fawr and Prestatyn Hillside.

The main calcicolous grassland community present at Mynydd Marian, Llysfaen is **upright brome *Bromopsis erecta* grassland (CG3)**. This is also present at Llanddulas and Rhyd y Foel. Livestock grazing probably ceased here in the 1960s, allowing this grassland to establish at the expense of sheep's fescue–meadow oat-grass grassland. The rank sward is dominated by the coarse upright brome with sheep's fescue, meadow oat-grass and quaking grass.

Some herbs do survive, including wild thyme, salad burnet, bird's-foot-trefoil and kidney vetch *Anthyllis vulneraria*. This grassland is very rare in north-east Wales and is near the north-western edge of its range in Great Britain.

More usual at sites where livestock grazing has relaxed, the sheep's fescue–meadow oat-grassland loses its component of fine-leaved grasses to become dominated by **meadow oat-grass (CG6)**. This tall sward also supports hairy oat-grass *Avenula pubescens*, quaking grass, red fescue *Festuca rubra* and sweet vernal grass. Salad burnet, bird's-foot-trefoil, harebell, ribwort plantain *Plantago lanceolata* and lady's bedstraw add variety. Prolonged absence of grazing can lead to the development of a rank species-poor sward dominated by cock's-foot *Dactylis glomerata* and false oat-grass *Arrhenatherum elatius*, with tall herbs such as hogweed *Heracleum sphondylium* over thick thatches of decaying plant litter.

At Craig Adwy-wynt, Pwllglas, is **sheep's fescue–mouse-ear hawkweed *Hieracium pilosella* - wild thyme grassland (CG7)**. This is a small area of open short turf closely grazed by rabbits amongst low limestone rock outcrops, limestone pavement and bare ground with drought-prone, thin, nutrient-poor soils. It occupies the very exposed summit ridge. Stands of this community are extremely rare in Wales. Short species such as wild thyme, spring sedge, ribwort plantain *Plantago lanceolata*, with annuals such as parsley-piert *Aphanes arvensis*, dove's-foot cranesbill *Geranium molle*, early hair-grass *Aira praecox* and changing forget-me-not *Myosotis discolour*, contrast with the characteristic tall herbs – hound's-tongue *Cynoglossum officinale*, common ragwort *Senecio jacobaea* and wood sage *Teucrium scorodonia*. Lower plants are conspicuous here, including mosses and many lichens.

The great majority of the calcicolous grassland communities are lowland but where land is at an altitude of 300 metres or so then an upland community, **sheep's fescue–common bent–wild thyme grassland (CG10)** can be found, for example at Bryn Alyn and Creigiau Eglwyseg. This community contains both calcicolous species such as wild thyme,

lady's-bedstraw and bird's foot-trefoil, and calcifugous species such as tormentil *Potentilla erecta* and heath bedstraw *Galium saxatile*.

Where the glacial till- or loess-derived soils are present, as at, for example, Llanddulas, Prestatyn Hillside, Mynydd Helygain and Bryn Alyn, heath vegetation represented by **heather *Calluna vulgaris*–western gorse *Ulex gallii* heath (H8)** occurs, usually in a mosaic with the sheep's fescue–meadow oat-grass grassland. More frequently associated with both the calcicolous grassland and heath are stands of bracken *Pteridium aquilinum* and common gorse, often where land is least accessible to grazing animals. As grazing declines, or where management of the heath by rotational annual burning has ceased, then bracken and common gorse take over.

Their future

The calcicolous grassland communities surviving in north-east Wales are now scattered in a handful of small sites, each of only several hectares. Only exceptionally at Llanddulas, Mynydd Helygain and Creigiau Eglwyseg are there larger areas of tens of hectares. Nevertheless, despite their small size, they retain their species-richness and value not only as refugia for rare plants but also for invertebrates such as butterflies and moths. These include populations of the long-established introductions of the Great Orme race of silver-studded blue *Plebejus argus caernensis* and other notable (not introduced) species including pearl-bordered fritillary *Boloria euphrosyne* and brown argus *Aricia agestis*.

The survival of these grasslands is mostly dependent upon their continued value as permanent pasture, aided by their occurrence on difficult terrain of thin rocky soils and steep slopes and cliffs that makes agricultural improvement impractical. They are often used as 'sacrifice' areas where livestock can be moved at certain times of the year to protect the productivity of more agriculturally valuable grasslands. There is usually a link to the pattern of landownership being either common land or tenanted/owner-occupied. The presence of non-native species of low-growing, spreading shrubs of the genus *Cotoneaster* and trees such as evergreen oak *Quercus ilex* are a further threat to these grasslands.

By March 2013 CCW had formally notified most of the 30 or so significant sites of unimproved calcicolous grassland as Sites of Special Scientific Interest (SSSI) to their owners and occupiers. Several of the sites are also Nature Reserves or Country Parks managed by Local Authorities. Nevertheless, SSSI status alone does not ensure these species-rich grasslands will survive. This depends upon public support and the continued availability of the resources to manage them sympathetically, combined with the enthusiasm and experience of the landowners and land managers themselves.

***Dr John Osley** worked at the Countryside Council for Wales (formerly the Nature Conservancy Council) Mold Office for 26 years as a Conservation Officer, and is now retired.*

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Glaswelltir calch

Mae priddoedd calchog bas yng ngogledd-ddwyrain Cymru'n cynnal cymunedau o blanhigion lled naturiol nodedig gan gynnwys llawer o rywogaethau o laswellt, hesg a pherlysiau. Maen nhw wedi goroesi drwy ddal i gael eu pori a heb gael eu gwrteithio'n artiffisial i gynyddu eu cynnyrch amaethyddol. Mae llai o bori yn arwain at dlodi'r borfa drwy adael i ddryslwyni ddatblygu. Daw ein gwybodaeth fanwl o arolygon a wnaed yn y 1990au. Mae chwe chymuned o laswellt yn ffynnu ar galch a 10 is-gymuned yn bresennol, wedi'u gwasgaru mewn llond dwrn o safleoedd bychain. Mae llawer yn Safleoedd o Ddiddordeb Gwyddonol Arbennig ond nid yw hynny ar ei ben ei hun yn sicrhau eu bod yn goroesi. Mae hynny'n dibynnu'n bennaf ar eu gwerth fel porfa barhaol, sydd yn ei dro'n dibynnu ar y ffaith fod digon o adnoddau ar gael i'w rheoli'n gydymdeimladol.

All photos: Liam Olds

Spoilt rotten - the wonders of colliery spoil tips

Heathland at Cambrian Colliery, Clydach Vale

Historically wildlife suffered as the south Wales coalfields expanded to fuel Britain's rise in the Industrial Revolution. But mining left behind huge spoil tips which are now providing unique and extraordinarily rich new habitats, particularly for invertebrates. ***LIAM OLDS*** *has been studying these unlikely strongholds of biodiversity.*

When one mentions coal-mining there is an instant association with south Wales. With its profusion of high quality coal, south Wales played a pivotal role in Britain's Industrial Revolution. More and more coal was needed to produce the steam power on which industrialisation depended. This high demand brought about a 'boom' in the south Wales coal industry. Attracted by the availability of work and better wages, people flocked to the south Wales valleys from all over Britain – including my Cornish ancestors.

The South Wales Coalfield covered an extensive area from Pontypool in the east to St Brides Bay, Pembrokeshire, in the west. At its peak, the coal-mining industry employed some 232,000 men in 620 coal mines across south Wales[1]. In 1913, 57 million tons of coal came up from these mines – a fifth of the entire output of the United Kingdom. The effects of World War I and the post-war depression, however, brought about a decline in the industry. By 1936, 241 collieries had closed and the workforce had halved[2]. Following a brief revival post-Second World

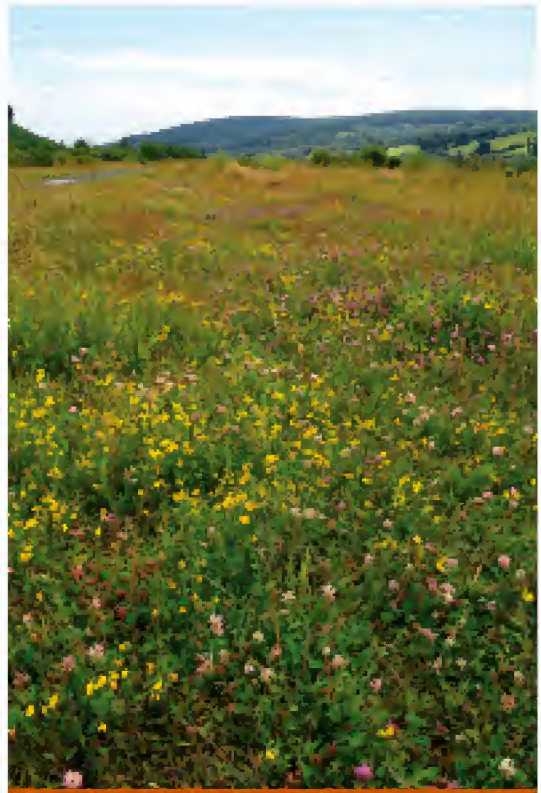
War, the industry continued to decline throughout the second half of the 20th century. By the end of that century, just one deep mine remained in Wales. The coal industry, the most important industrial, social and political force in modern Wales, had all but vanished.

Nearly all the signs of this once thriving industry have been lost, with colliery buildings demolished and shafts capped. One thing has remained however: the numerous colliery spoil tips littering the landscape. Centuries of intense mining activity ultimately generated excessive quantities of waste, which was subsequently tipped upon the valley sides. Such spoil tips have become an iconic feature in the landscape of the south Wales valleys, an industrial and cultural legacy from our rich mining history.

Following the Aberfan disaster in 1966, many spoil tips were cleared amid fears of similar tragedies lying in wait. Those deemed stable remained, and were left undisturbed to revegetate naturally over time. Once black eyesores in the landscape, these spoil tips are now greener than ever before. They have undergone a radical transformation, clearly displaying the resilience of nature. Often overlooked and under-appreciated, many now support habitats and wildlife of considerable local biodiversity value.

The biology of spoil

A colliery spoil tip is highly diverse landscape of varied topography, aspect, substrate composition, hydrology, pH, and levels of disturbance and neglect. This variation allows for the formation of complex habitat mosaics in close proximity. As such, colliery spoil tips can support wildflower-rich grassland, heathland, bare ground, wetland, scrub and lichen heath – ideal environments for invertebrates, many



Flower-rich grasslands at Coedely Colliery

of which require two or more habitats to complete their lifecycle. These habitat mosaics enable a single site to support rich assemblages of habitat specialists, alongside more generalist species[3].

The presence of bare ground is of particular importance, creating warm microclimates in which thermophilic invertebrates can bask. It also provides burrowing and ground-nesting opportunities, and foraging areas for visual predators such as spiders and ground beetles. Although common, the none-the-less impressive green tiger beetle *Cicindela campestris* is a regular sight in such areas.

The thin, nutrient-poor soils are another key feature of colliery spoil tips. These stressed conditions prevent dominant plant species from taking over, slowing vegetation succession and leading to the formation of flower-rich grasslands. The strong assemblage of nectar-rich, stress-tolerant annuals provides abundant forage for bumblebees,

Six-belted clearwing *Bembecia ichneumoniformis*
Cliradain chwe rhesen

honeybees, solitary bees, hoverflies, beetles, butterflies and moths. With reports highlighting growing evidence for declines in pollinator species, it is clear how important these sites are to the future well-being of pollinators in the south Wales valleys.

Habitats and associated species

With slow rates of vegetation succession, colliery spoil tips are largely open, dry and sunny habitats. These open conditions favour the formation of flower-rich grasslands, supporting numerous Lepidopteran species including small pearl-bordered fritillary *Boloria selene*, dark green fritillary *Argynnis aglaja*, dingy skipper *Erynnis tages*, and six-belted clearwing *Bembecia ichneumoniformis*. They also act as importance foraging sites for numerous bumble-bee species including the brown-banded carder bee *Bombus humilis*, a UK Biodiversity Action Plan priority species.

Slow vegetation succession also results in substantial bare ground cover, supporting numerous carabids such as *Poecilus cupreus*, *Harpalus rubripes* and *Cicindela campestris*. Mottled grasshoppers *Myrmeloetettix maculatus* and grayling butterflies *Hipparchia semele* also utilise these bare ground

Varied topography on Gelli Tips

Grayling *Hipparchia semele* Gweirlöyn llwyd

areas. The grayling is particularly well suited to spoil tips, its cryptic colouring providing excellent camouflage against the black spoil.

Where grasses are able to grow, the absence of any grazing management means they grow long, creating areas of tall and rank dry grassland. These grasslands support numerous Hemipteran species including bishop's mitre shieldbug *Aelia acuminate*, and act as ideal habitats for the marbled white *Melanargia galathea*, a distinctive and rather attractive butterfly.

At higher altitudes, heather (*Calluna sp.*) has formed expansive areas of heathland. These heathland habitats support species such as the heather shield-bug *Rhacognathus punctatus* and mountain bumble-bee *Bombus monticola*. On sites subject to succession for many years, solid blocks of scrub or woodland have sometimes developed. These habitats are utilised by hoverfly species such as *Xylota segnis* and *Baccha elongata*. The giant tachinid fly *Tachina grossa* and *Tachina ursine* also frequent these woodland rides.

The complex nature of spoil tips, with their varied topography and aspect, inevitably mean some areas become wetter than others. In areas of impeded drainage, wetland habitats have developed including reedbed, wet flushes, ponds, lakes, wet grassland

and bog. These habitats support numerous dragonfly species including keeled skimmer *Orthetrum coerulescens*, and wetland hoverfly species such as *Tropidia scita* and *Sericomyia silentis*.

Threats and looking forward

Over the past few decades, colliery spoil tips have become increasingly important as vital refuges for rare and scarce invertebrates that have suffered from declines in more natural habitats. By linking with traditional habitats the tips also act as important stepping-stones in the environment, allowing species to move freely across the landscape. Despite this, these sites are often greatly overlooked and under-appreciated as biologically interesting places. Due to their 'brownfield' label they are seen by many as industrial wastelands devoid of life. With the growing housing shortage in the UK, colliery spoil tips are under increasing pressure from development. The Government is continually urging local authorities to build on 'brownfield' sites over the much favoured 'greenfields'. Inappropriate 'restoration', inappropriate management, and natural succession also threaten these biodiversity-rich sites. More needs to be done to secure the long-term future of colliery spoil tips and other 'brownfields' in Wales.

Interest in these sites is growing, clearly highlighted by the focus of my traineeship – and this needs to continue. Working with the National Museum of Wales, Cardiff, I am currently surveying colliery spoil tips in south Wales to gain a better understanding of the invertebrate assemblages found here. This information will be relayed back to landowners in an attempt to aid the conservation of these sites and the species they support. Colliery spoil tips are highly diverse and fascinating landscapes rich in biodiversity: it would be such a shame to lose them. I hope that one day in the near future, the long-term security of our most biodiverse spoil tips will be secured.

Reedbed at Cwm Colliery, Beddau

***Liam Olds** is currently undertaking a 12-month study of colliery spoil habitats as part of The Conservation Volunteers Natural Talent Traineeship – funded by The Esmée Fairbairn Foundation. He can be contacted at Department for Natural Sciences, National Museum Wales, Cardiff, CF10 3NP, Liam.Olds@museumwales.ac.uk, or 02920 573170 / 07947 141080.*

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Tomennydd glo

Mae etifeddiaeth y diwydiant glo bron iawn â diflannu o dde Cymru ond mae'r tomennydd glo yma o hyd. Mae amrywiaeth eu topograffeg, eu cyfansoddiad a faint y maen nhw wedi'u hesgeuluso wedi arwain at ddatblygu mosaig cymhleth o gynefinoedd. Mae'r amrywiaeth hwnnw'n arbennig o addas ar gyfer infertebratau, sydd angen, yn aml, ddau neu ragor o gynefinoedd i gwblhau'u cylchoedd bywyd. Mae blodau unflwydd llawn neithdar yn ffynnu mewn pridd sy'n brin o faetholion, sy'n golygu fod digonedd o fwyd ar gael i wenyn a phryfed eraill. Mae tir noeth yn arbennig o bwysig gan ei fod yn cynhesu ac yn dod yn lle i dorheulo ac i adeiladu nythod. Ond, mae'r safleoedd hyn mewn perygl. Fe'u gelwir yn dir llwyd, nid yw eu gwerth yn cael ei gydnabod ac maen nhw'n cael eu targedu ar gyfer eu datblygu gan y rhai sy'n eu gweld yn dir diffaith diwydiannol. Mae Amgueddfa Cymru ar hyn o bryd yn arolygu'r safleoedd i gael gwell syniad o'u gwerth.

Sefydliad Morgan Parry Foundation

Roedd Morgan Parry yn lladmerydd uchel iawn ei barch dros fyw o fewn terfynau naturiol. Roedd yn angerddol ynghylch ein hamgylchedd naturiol a dangosodd drwy'r ffordd yr oedd yn byw ei bod yn bosibl i ni yng nghymdeithas y Gorllewin droedio'n ysgafn iawn ar y ddaear hon. Yn gyfathrebwr galluog, roedd yn ein herio ni i ddilyn ei lwybr gyda'i ysgrifennu huawdl, ei ddarlithoedd rhugl a thrwy'r hyn yr oedd ef ei hunan yn ei wneud. Roedd popeth a wnâi yn cael cefnogaeth ei deulu, a oedd yn ymuno o'u gwirfodd i ddilyn ffordd o fyw â chyffyrddiad ysgafn sy'n dal yn wers i ni i gyd.

Daeth Morgan, a aned ac a gafodd ei fagu yn Lerpwl, yn ôl i'r Gymru a garai gymaint ar ôl gadael y brifysgol. Roedd yn ymgyrchydd brwd dros CND, Cyfeillion y Ddaear ac eraill, yn ogystal â bod yn hyrwyddwr angerddol dros y Gymraeg a diwylliant Cymru. Yn ffigwr arweiniol yn y mudiad amgylcheddol yng Nghymru am fwy na thair degawd, daeth yn Gyfarwyddwr Ymddiriedolaeth Bywyd Gwyllt Gogledd Cymru ar ôl rhai blynyddoedd yn Warden Padarn a Glynllifon, Caernarfon. Aeth yn ei flaen i sefydlu cangen Cymru o Gronfa Bywyd Gwyllt y Byd, daeth yn gadeirydd Cynnal Cymru ac yna'n gadeirydd Gyngor Cefn Gwlad Cymru. Roedd yn aelod o fwrdd Cyfoeth Naturiol Cymru pan fu farw ddwy flynedd yn ôl ar ôl brwydro am chwe mis gyda salwch difrifol.

Roedd Morgan yn sylweddoli mai o du dynoliaeth, yn bennaf, y deuai'r bygythiad i'n byd naturiol - ac mai dynoliaeth hefyd allai ei atal. Er fod llawer o bobl yn gallu gweld canlyniadau peryglus ein ffordd ni o fyw yn y gorllewin, a llawer yn gallu ysgrifennu a thraethu'n awdurdodol ar y pwnc, ychydig sy'n croesi'r bont gul ac yn lleihau i'r eithaf effeithiau eu bywydau nhw eu hunain. Roedd Morgan yn un o'r garfan fechan honno y mae llawer ohonom ni'n ceisio, ond yn methu, ymuno â hi. Cafodd Sefydliad Morgan Parry Foundation ei sefydlu gan ei deulu, ei ffrindiau a'i gydweithwyr er cof amdano ac i barhau â'i waith.

Mae'r Sefydliad, sy'n cael ei ariannu gan gyfraniadau cyhoeddus a phreifat, yn cael ei reoli gan grŵp o Ymddiriedolwyr a'i gadeirio gan Jane Davidson (cyn Weinidog yr Amgylchedd a Chynaliadwyedd Llywodraeth Cymru). Nod y Sefydliad, sydd wrthi ar hyn o bryd yn gorffen y broses o ddod yn elusen, yw hyrwyddo addysg y cyhoedd mewn pynciau sy'n ymwneud â datblygu cynaliadwy a gwarchod, gwella ac adfer yr amgylchedd naturiol.

Bydd hyn yn cael ei wneud drwy gystadleuaeth

flynyddol am Wobr Sefydliad Morgan Parry, gan gychwyn yn 2015. Lansiwyd y gystadleuaeth gyntaf yn yr Eisteddfod Genedlaethol ym Meifod bythefnos yn ôl a, phythefnos ynghynt, yn y Sioe Fawr yn Llanelwedd.

Mae'r gystadleuaeth eleni'n anelu at rai 16-19 oed sy'n byw yng Nghymru (h.y. y rhai ddim ieuengach na 16 a dim hŷn na 19 ar 31 Rhagfyr 2015). Y dasg sy'n wynebu'r cystadleuwyr yw ysgrifennu traethawd ar thema a fydd yn gyfarwydd i'r rhai sydd wedi dilyn ysgrifau Morgan: *Gallwch fod yn bwy bynnag yr ydych eisiau bod, yn ysgrifennu un ai drwy edrych ymlaen heddiw a dweud beth fyddech yn ei wneud, neu drwy edrych yn ôl yn 2050 a dweud beth fyddech wedi'i wneud, i ddiogelu Cymru ar gyfer y cenedlaethau i ddod.*

Bydd gwobrau yn y gystadleuaeth i'r traethodau buddugol, Cymraeg a Saesneg, a'r dyddiad cau yw 30 Tachwedd 2015. Mae panel o feirniaid nodedig, gydag arbenigedd ym maes y gystadleuaeth eleni, wedi'i benodi i ystyried y cyfraniadau. Mae'n cynnwys yr Athro Gareth Wyn Jones, Peter Davies ac Elinor Gwyn.

Bydd awduron y ddau draethawd buddugol yn ennill gwobr o £500 yr un a fydd, yn unol â syniadau Morgan Parry, yn cael ei ddefnyddio i hyrwyddo'r syniadau a'r gwaith sy'n cael eu disgrifio yn eu traethodau. Bwriada'r Ymddiriedolwyr gyhoeddi'r traethodau buddugol, nid yn unig ar wefan y Sefydliad ond hefyd yn y wasg ac mewn cylchgronau addas, unwaith eto'n unol â chred Morgan y dylem ni gynyddu ymwybyddiaeth o'r llwybrau eraill sydd ar gael i bawb ohonom.

Bydd y gwobrau'n gyfle gwych i'r enillwyr ddatblygu eu syniadau ymhellach ac, i wneud yn siŵr fod yr hyn y maen nhw'n ei ddysgu drwy'r broses hon ar gael i bawb. Bydd gofyn iddyn nhw ysgrifennu adroddiad byr a fydd hefyd yn derbyn cyhoeddusrwydd gan y Sefydliad.

Os hoffech chi ddysgu mwy am Sefydliad Morgan Parry Foundation, ewch i **www.morganparry.cymru**. Mae yno hefyd ddolen i ddarlith ysbrydoledig Morgan i'r Sefydliad Materion Cymru yn Eisteddfod Genedlaethol y Bala yn 2009.

Mae croeso i gyfraniadau ariannol i'r sefydliad. Gellir cyfrannu drwy'r ddolen JustGiving ar y wefan neu ffoniwch 01286 831781 am ragor o fanylion.

***Roger Thomas** oedd Prif Weithredwr Cyngor Cefn Gwlad Cymru rhwng 2002 a 2013, ar ôl treulio cyfnod o chwe blynedd fel Cyfarwyddwr Asiantaeth yr Amgylchedd Cymru. Yn awr, mae'n Gadeirydd Ymddiriedolaeth Natur Gogledd Cymru ac yn un o ymddiriedolwyr gwreiddiol SMPF.*

Morgan Parry was a highly respected advocate for living within natural limits. He was passionate about our natural environment and showed us through the way he lived his life that it is possible in Western society to tread this earth with a light footfall. A gifted communicator, he challenged us all to follow his path through his eloquent writing, articulate lectures and his own actions. He was supported in everything he did by his family, who willingly engaged in pursuing a low impact lifestyle that continues to serve as a lesson to us all.

Morgan, born and raised in a Welsh-speaking family in Liverpool, settled in the Wales he loved after university. He was an active campaigner for CND, Friends of the Earth and others, as well as an ardent champion for Welsh culture and heritage. A leading figure in the environmental movement in Wales for more than three decades, he became Director of the North Wales Wildlife Trust after some years as Warden of Padarn and Glynllifon, Caernarfon. He then went on to establish the Welsh branch of WWF, became chair of Cynnal Cymru and then chair of the Countryside Council for Wales. He was a board member of Natural Resources Wales when he passed away two years ago, after a six-month battle with serious illness.

Morgan realised that the threat to our natural world came principally from humanity – and that humanity was also the solution. Whilst many can see the dangerous consequences of our western lifestyles,

NWWT

Morgan Parry ifanc (ar y pen ar y dde) yn cefnogi Wildlife Action Fund
A youthful Morgan Parry (far right) supporting the Wildlife Action Fund

and quite a lot can write and speak with authority on this subject, few make the difficult transition towards minimising the impact of their own lives. Morgan was one of this small band that many of us aspire, but fail, to join, and the Morgan Parry Foundation (SMPF) has been established by his family, friends and colleagues in his memory in order to continue his work.

The SMPF, funded by public and private donations, is managed by a group of Trustees chaired by Jane Davidson (formerly Minister for the Environment and Sustainability in the Welsh Government). The objective of the SMPF, which is just completing the registration process to become a charity, is to advance the education of the public in subjects relating to sustainable development and the protection, enhancement and rehabilitation of the natural environment.

This will be achieved through an annual competition for the Morgan Parry Foundation Award, starting in 2015. This first competition was recently launched at both the National Eisteddfod in Meifod and, two weeks earlier, at the Royal Welsh Agricultural Show.

This year's competition is aimed at 16-19 year olds resident in Wales (ie those no younger than 16 and no older than 19 on 31 December 2015). The task facing entrants is to write an essay on a theme that will be familiar to those who have followed Morgan's writing: *You can be whoever you want to be, writing either in the present day about what you would do, or from the perspective of 2050 about what you would have done, to secure Wales for future generations.*

The competition will have awards for the winning entries in both Welsh and English and closes on 30th November 2015. A distinguished panel of judges, with expertise in the subject area of this year's competition, has been appointed to consider the entries. They include Professor Gareth Wyn Jones, Peter Davies and Elinor Gwynn.

The writers of the two winning essays will be awarded a prize of £500 each that, in keeping with Morgan Parry's thinking, will be used to progress the ideas and actions described in their entries. The Trustees intend to publish the winning entries not only on the SMPF website but also in the press and suitable journals, again in keeping with Morgan's belief that we should raise awareness of the alternative paths that are available to us all.

The prize money will give the winners a wonderful opportunity to take their ideas further and, to ensure that what they learn through this process becomes widely available, they will be required to write a short report that will again be publicised by the SMPF.

If you would like to learn more about the SMPF or this year's competition, please visit **www.morganparry.cymru**. Here you will also find a link to Morgan's inspiring 2009 Institute of Welsh Affairs Lecture, given at the Meirion and District National Eisteddfod in Bala.

Donations to the SMPF are welcome and can be made via a JustGiving link on the website, or phone 01286 831781 for more details.

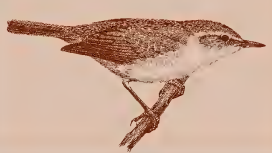
***Roger Thomas** was Chief Executive of the Countryside Council for Wales between 2002 and 2013, following a period of six years as Director of Environment Agency Wales. He is now chair of the North Wales Wildlife Trust and a founder trustee of the SMPF.*

All photos Malcolm Berry

Weaving the web:
towards a natural garden

A range of different habitats attracts a greater variety of species

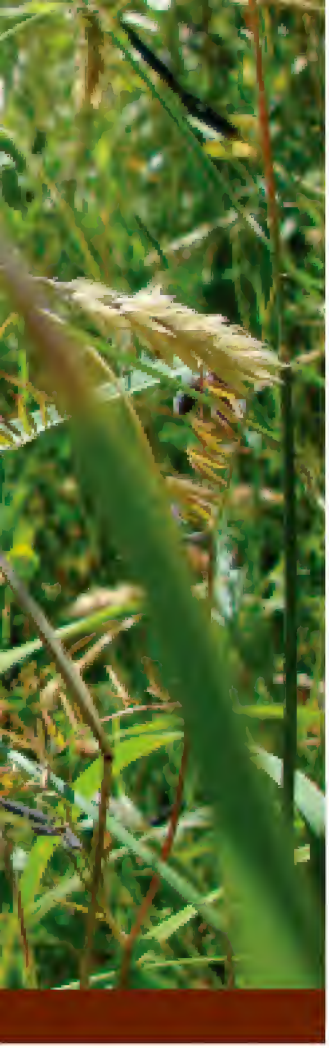
*Can successful growing of fruit and vegetables ever be fully compatible with the requirements of biodiversity? **MALCOLM BERRY** thinks it can, at least when growing at home. Here he shares some experiences from his journey into polyculture.*



I have worked in professional horticulture for around 16 years, and most of this time I have been involved with growing fruit and vegetables. I have worked on a farm-scale and in gardens, so you could say I'm familiar with accepted methods of crop cultivation. A few years ago I began to question the practice of monoculture, where all of one crop is grown together. This was initially because it seemed to do little to promote biodiversity, quite the reverse in fact. I regard myself as a natural gardener, which means I put nature first in my garden. I want my patch to be bursting with life in as many different forms as possible, both plant and animal. This can only be achieved through diversity: monoculture just doesn't measure up.

Monocultural madness

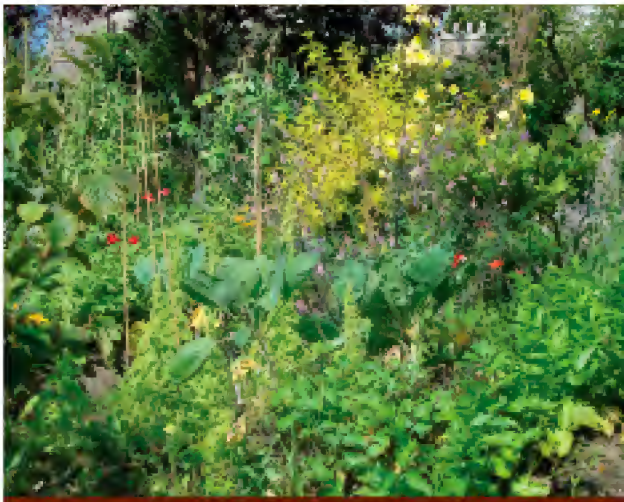
Monoculture is essentially a human invention for our own convenience; it is rarely found in nature. It grew in popularity with the move to large-scale production of fruit and vegetables after the introduction of machinery. Then it was desirable to grow whole fields of just one crop



because it was quicker and easier to maintain and harvest. The practice was adopted by allotmenteers, and it carried on into our gardens.

The main problem with monoculture is the lack of biodiversity amongst the crops themselves, which is more evident on a large scale. There may be greater biodiversity around field margins these days, but monoculture literally means a dearth of diversity in the actual crop. Growing all of one crop together is the horticultural equivalent of putting all your eggs in one basket, as they are far more vulnerable in a group. Grown in a block they are a big advert to pests, and if one plant becomes diseased it may spread through the entire crop.

Whilst monoculture may make economic sense on a large scale, we have no need to grow like this at home. Surely the better option on a small scale is polyculture, where fruit and vegetables are mixed together and grown amongst trees, shrubs and herbaceous plants. This is a far more naturalistic method and attracts and sustains a greater abundance of life.



Polyculture – a mixture of fruit and vegetables grown amongst trees, shrubs and herbaceous plants

Polycultural playtime

Before getting into finer detail, let's have some broad strokes. In the garden, as in life generally, diversity is the key. Horticulturally, it all starts with the plants; if we have as many different types of habitat as our gardens can accommodate, it will allow different ranges of plants to be utilised. This in turn will attract different ranges of wildlife. The various habitats I have in my garden are a pond, a flowering meadow and hedges both evergreen and deciduous. All of these help to support a myriad of creatures and plants, which greatly increases the overall biodiversity in the garden.

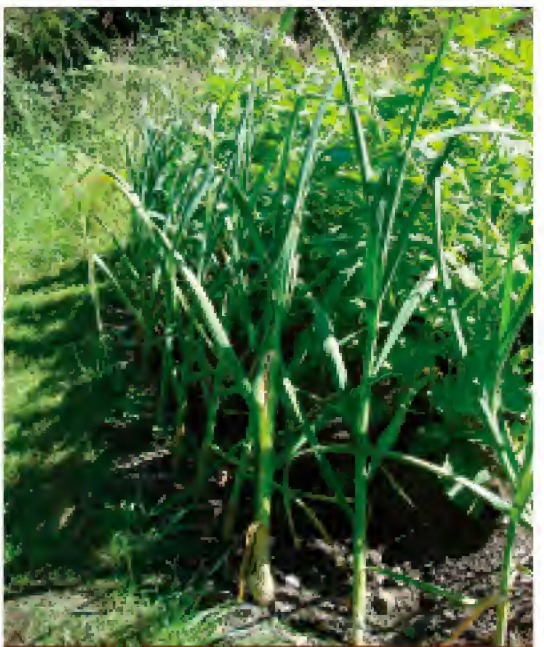
This multitude can be retained by ensuring they have what they need in terms of food, water, shelter, hibernation and breeding. If we can fulfil these requirements then we make possible the ultimate aim of natural gardening; to bring the garden to a state of dynamic stability. This may seem contradictory, but when pests and predators are in balance, harmony is maintained, and there is no need for us to intervene. Sounds like paradise, doesn't it? I have to admit that I haven't reached this myself as yet, although I appear to be heading in the right direction.

Aside from the different habitats, most of my roughly triangular, sloping garden is cultivated ground to give as much room as possible for planting. Access is via grass paths of about 2ft/60cm width snaking around and through it. Within this basic framework I attempt to weave a tapestry of colour, form and texture using fruit and vegetable crops, ornamentals and wild plants. Fruit and ornamental trees and bushes are dotted here and there, and a large walnut tree stands in one corner with a rambling rose growing through it. Around most of the trees and shrubs are grown many different flowers, with

As much of the garden as possible is cultivated, with access via grass paths

Self-sowing annual and biennial flowers of wild and cultivated origin are used throughout the garden. Most were chosen for their wildlife benefit, such as *Phacelia tanecetifolia* (most attractive to bees) and the poached egg plant *Limnanthes douglasii* (most attractive to hoverflies). Others were here already, including greater mullein *Verbascum thapsus*. I continue to grow this as food plant for the mullein moth *Cucullia verbasci* larvae. Alongside these shorter-lived plants grow many different types of herbaceous perennials. This multitude of flowers increases the likelihood of pollination of the crops by attracting many different insects.

shade-loving plants used under the larger trees. Around and between these flowery patches is where the vegetables are planted, although flowers also grow in amongst them.



Shallots, garlic, winter radish and herbs like parsley and basil have all been used to good effect along borders

As for the vegetables, I have grown them in a variety of ways so far, although I do still apply the essential practice of crop rotation. This is defined as leaving a gap of as many years as possible before growing the same crop in the same piece of ground again.

- I apply a principle of ornamental horticulture to suitable crops by planting them in odd-number groups, mostly threes and fives. This seems to work particularly well for tomatoes grown as cordons.
- I use courgettes as 'dot' plants by planting them individually around the garden where I have left sufficient space. This technique also works nicely for lettuce.
- Runner and climbing French beans are grown up wigwam supports (5 canes, 2 plants per cane), but these are also spread around the garden.
- Shallots, garlic, winter radish and herbs like parsley and basil are used to good effect bordering paths.
- Crops that are sown directly into the ground, such as parsnips and carrots, are done so in short rows and in three or four different areas.
- With peas, it's difficult to do anything other than grow a quantity together. So, as I make several

sowings through the season of two varieties (one a mange-tout), I ensure the later sowings are made elsewhere.

There have been exceptions to the mixing of everything described above, the main one being potatoes. In the past I have grown three varieties, all for a different cooking use, with two of them having red skins. As I didn't want to risk confusing which was which, I grew each individual variety in its own mini-monoculture separately from either of the others. Other exceptions have been due to my seed-saving efforts. I prefer to be sustainable in the garden and see one vital facet of this as saving as much of my own vegetable seed as possible. Many vegetables require you to collect seed from at least 16 or 24 individual plants. The best way to ensure good pollination of all plants, and therefore a good seed crop, is, ironically, monoculture!

Learning through play

I can't say that I'm a polyculture expert; I've just been playing about like this for around three years and learning as I go along. I'll try something out and see if it works; if it does then great, I'll try the same thing next season. If not, then I'll do it differently and see what happens. As long as I'm observing closely enough and applying any learning, then progress is being made. So far the signs have been promising.

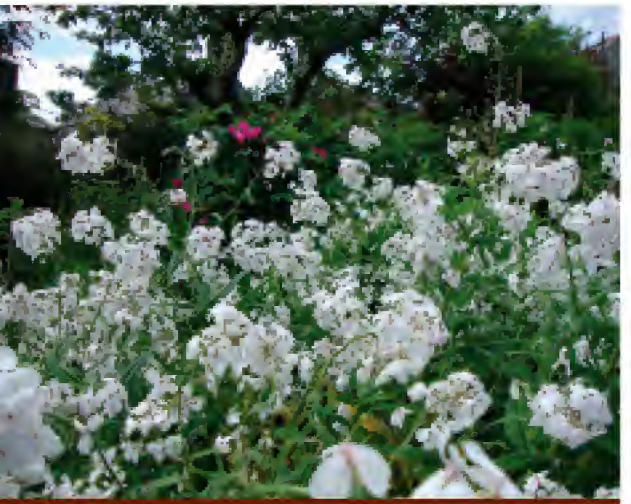
One early success I had involved kale. One spring I left a couple of kales to flower as they weren't going to be in the way, and one of these became colonised by aphids. My newly planted brassicas were protected under cloches, so I had no problem leaving the aphids to their own devices. It was fascinating to watch them. The main observation was the number of other insects the colony supported, mostly through the honeydew that all sap-sucking insects excrete. This sweet, sugary substance that turns ants into farmers draws a range of other insects. I also witnessed mysterious ripples of movement passing through the colony, possibly to signal the presence of a predator. One that found them must have been a species of parasitic wasp. I didn't see a single adult, but I saw the damage they caused. One day I noticed some aphids had turned

The brown aphids have been eaten from the inside out by parasitic wasps

brown, and closer inspection revealed a hole in their backs. This was the exit hole for an adult wasp that had passed its larval stage inside the aphid, eating it from the inside out. This is life red in tooth and claw, but also a good step towards achieving the goal of dynamic stability, only made possible by leaving the aphids alone where they weren't an issue. Without the aphids, there would be no wasps.

The above lesson brought me to natural gardening's inevitable conclusion regarding pests; we not only have to tolerate them, we have to actively encourage them. The inescapable truth is that without the prey there are no predators. Some predators, such as hoverflies, may be lured in initially using suitable flowers, but they will leave again if there are no aphids for their young to feed on. This is where sacrificial plants are invaluable; those grown just for pests to attack. Favoured crops can be monitored and pests removed, but at least these will still have a place to exist in the garden, to potentially be food for something else. This is back garden biodiversity, somewhere we can all make a massive contribution to supporting life just by what and how we grow.

I have applied the lesson this year with my brassicas (Brussels sprouts, kale and sprouting broccoli).



Sweet rocket (*Hesperis matronalis* Croes yr hwyr) is in the brassica family and will attract cabbage white butterflies (*Pieris spp.*)

Major pests here are the caterpillars of small and large white butterflies; the dreaded cabbage whites. Up until now I have planted my brassicas in groups of three or five, but this is still too many together as they remain highly attractive to the butterflies. So this year I tried all my brassicas as single plants and employed the twist of having big blocks of sacrificial plants; nasturtiums and sweet rocket *Hesperis matronalis*. Both are in the brassica family and therefore also attract cabbage whites, which should find the larger groups of sacrificial plants more easily than single ones of the crops mentioned. It's too early to judge its effectiveness, for a number of reasons. Apart from one growing season never being enough to assess something like this, there were relatively low numbers of cabbage whites early on, although I have seen more of them just recently. Also, my main nasturtium patch was in very poor soil, so the plants stayed small and somewhat yellow-leaved. Some brassicas have been found by the butterflies, but the caterpillars were removed by predators before much damage was done. I even saw a common wasp in the process of capturing a small white caterpillar. I'll try this method again next year because it feels right, but I'll grow the nasturtiums in better soil.

Here are some more points of observation and learning I have had:

- Last year I became very aware of the importance of having continuity of flowering. It is essential to provide a supply of pollen and nectar to insects that may be on the wing on any day throughout the year. So this year I started having periodic counts of the number of different species flowering here, and the last three counts were 102 on 30th May, 128 on 7th July and 147 on 9th August. Even in the midst of heavy frosts back on 7th February I had 20 different species with at least one flower open. I have wondered if this abundance of flowers might distract pollinators from the crops, but this doesn't seem to be the case.
- A great discovery last year was Dahlias with edible tubers. These species have not been bred for show, but still come in a variety of colours and forms. I left mine to flower and found that they were the most attractive plants in the garden for all manner of insects. One new queen red-tailed bumblebee *Bombus lapidarius* spent two days and nights nestled in the flowers of a single plant, feeding up for hibernation. I have grown a few more of these this year.
- I've not been entirely happy with the way I've been growing my potatoes. I want to include them in the polyculture and so I've dropped one of the red-skinned varieties. This year I have 4 or 5 tubers together in short rows spread around the garden.
- While I can grow good carrots in the ground here, I lose too many at the seedling stage to slugs. This year I've grown my carrots in large pots, which has been very successful as I haven't lost any.
- Appropriate management is the key to success in the natural garden, which generally means going against the aesthetic ideal that most have of what a garden should be like. 'Weeds' are the main issue here, but let's put nature first. These 'weeds' make good winter ground cover to prevent loss of soil nutrients and they provide shelter for insects and spiders. If weeding stops in August they have a chance to establish before the soil cools down. Weeds such as these made up around half of the count of 20 species flowering in February mentioned above.

It is this last point of management that is of vital importance. In the garden we shouldn't be working just for ourselves; we should be working for the

This new queen red-tailed bumblebee *Bombus lapidarius* spent two days and nights nestled in the flowers of a single Dahlia plant, feeding up for hibernation

benefit of all life. For me, nature's concerns are primary, and I couldn't do it any other way. To help indicate my effectiveness here, I have identified more of the life that shares this garden with me. So far this year I have seen the hairy-footed flower bee, bee fly, tree bumblebee, crab spider, nursery web spider, wasp beetle, blue-tailed damselfly, and I'm now up to 13 species of butterfly. The more individuals of more species that I can attract and retain are the best measure of success.

Chaos is order

In conclusion, I'm enjoying myself! Working like this seems to be a more instinctive, intuitive gardening process. The mix of ornamental and productive plants certainly creates a real 'cottage garden' feel, with colour everywhere you look. I still have more to do and try, but there have been more successes than failures to date. I urge anyone growing their own fruit and vegetables to consider using polyculture and nature-conscious gardening techniques. It is far better for biodiversity and people than monoculture and chemical use can ever be.

The overarching lesson of the whole endeavour is that diversity brings stability; chaos is order, the natural order. The web of life is the only web that truly matters; and we can help to weave it.

***Malcolm Berry** teaches horticulture to individuals and groups in his own garden and elsewhere.*

Tuag at ardd naturiol

Anaml y mae dim ond un cnwd yn tyfu'n naturiol mewn un man. Efallai fod angen hynny wrth ffermio ond does dim rhaid dilyn hynny yn ein gerddi, ym mhatrymau traddodiadol y gwelyau blodau a lleiniau llysiau. Mae plannu cymysgedd o ffrwythau, llysiau, coed a bylbiau'n gallu bod yn llesol i blanhigion, anifeiliaid a phryfed mewn gwahanol ffyrdd. Mae plâu yn llai tebyg o ledaenu ymysg cnydau sydd wedi'u gwasgaru trwy'r ardd a bydd dilyniant o blanhigion yn blodeuo ac yn ffrwytho'n bwydo pryfed ac adar ar adegau pan fydd bwydydd eraill yn brin. Mae ysglyfaethwyr, megis larfa'r fuwch goch gota, angen pryfed glas yn fwyd, felly mae tyfu cnydau aberthol yn gallu helpu i warchod llysiau gwerthfawr ac, yr un pryd, yn cynnal pryfed llesol. Mae chwyn unflwydd yn orchudd da i'r ddaear dros y gaeaf, mae'n atal colli maetholion ac yn gysgod i bryfed cop a chwilod.

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Dartford warblers in Wales

Dartford warbler *Sylvia undata* Telor Dartford

The tiny Dartford warbler differs from almost all our breeding warblers by staying here year-round, which does leave it very vulnerable to severe winters. In 1998 it bred in Wales for the first time. ***HANNAH MEINERTZHAGEN*** *tells us about her research on this species in Gower, carried out for an MSc at Swansea University.*

Thirteen species of warbler breed every year in Britain, nine of these being strict migrants leaving Britain and mostly wintering south of the Sahara. Of the four species which can be seen here in winter, the blackcaps visiting our garden feeders are known to return to Germany (and surrounding areas) to breed, while our wintering chiffchaffs in wetlands leave in spring to breed in unknown parts. This leaves only two strictly resident species, Dartford warbler *Sylvia undata* and Cetti's warbler *Cettia cetti*. The latter colonised Britain as recently as 1973.

Dartford warblers in Britain

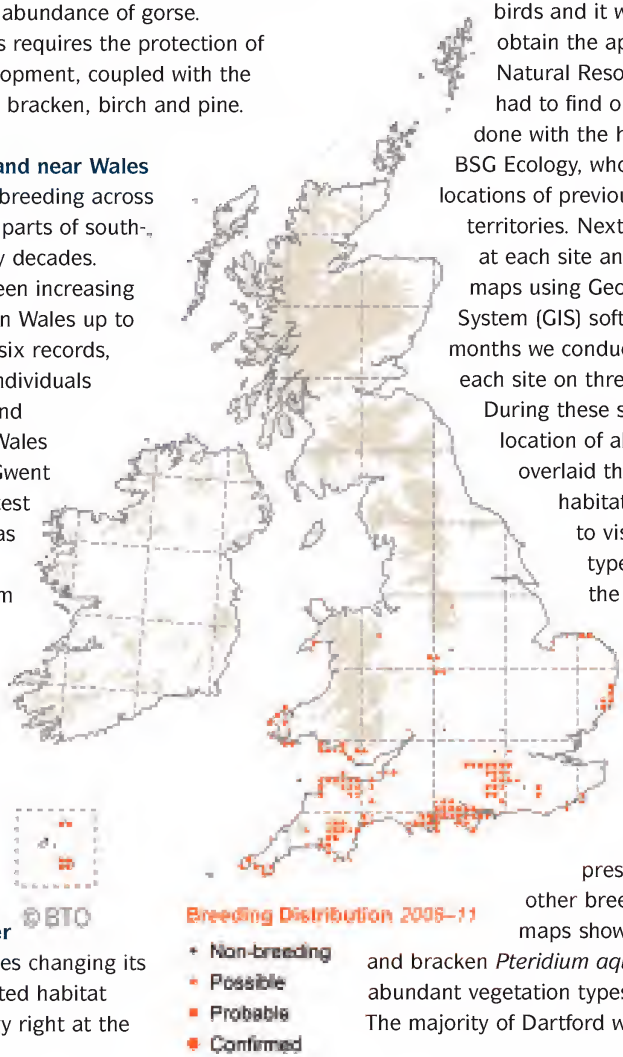
This is primarily a Mediterranean species whose recent range has been extending northwards, probably linked to climate change, with declines at the southern limit of its range in Spain. It was was first detected as a British species when John Latham shot a pair near Dartford in 1773. Fifty miles further east and it would have been called the Sandwich warbler! As an insectivorous species it is severely affected by winters with very low temperatures, and the resulting mortalities cause major

contractions in range. Conversely, a run of mild winters allows considerable range expansion to occur. The BTO Atlas map shows the breeding distribution by hectad (10km square) in 2008-11.[1]

In England and Wales the Dartford Warbler is still largely restricted to heathland, where investigation of its ecology was pioneered by Colin Bibby[2,3,4]. He found that they often foraged for insects preferentially within gorse *Ulex europaea* bushes. This was thought to be because gorse supported a greater invertebrate density than other habitat types found within heathland. He suggested that habitat quality and, consequently, breeding productivity was directly related to the abundance of gorse. Conserving the species requires the protection of heathlands from development, coupled with the control of encroaching bracken, birch and pine.

Dartford warblers in and near Wales

The species has been breeding across the Bristol Channel in parts of south-west England for many decades. Numbers there had been increasing since the 1980s, but in Wales up to 1992 there were just six records, mostly of wandering individuals between September and January. Breeding in Wales was first recorded in Gwent in 1998 and in the latest BTO Atlas breeding was confirmed in 14 hectads. The jump from south-west Wales to north Wales was discovered by a BTO volunteer visiting the Llŷn peninsula in February 2010; breeding was confirmed in 2011 and still continues.



©BTO Bird Atlas Mapstore

Field studies in Gower

As a charismatic species changing its range and with restricted habitat preferences, its ecology right at the range fringe is of interest. As part of my studies at Swansea University I spent the summer months of 2014 studying Dartford warblers on the Gower Peninsula, together with Julian Trevino-Villarreal (another Masters student). We wanted to understand the local factors that determined the distribution of Dartford warblers and also provide useful findings that could inform local management for the species. Consequently, we decided that our aim would be to identify which habitat types were most important to Dartford warblers on the south coast of the Gower Peninsula.

Dartford warblers are Schedule 1 listed birds and it was first necessary to obtain the appropriate licence from Natural Resources Wales. Then we had to find our warblers, which was done with the help of Owain Gabb from BSG Ecology, who had recorded the locations of previous Dartford warbler territories. Next we mapped the habitat at each site and produced digitised maps using Geographical Information System (GIS) software. For the next few months we conducted dawn surveys at each site on three separate occasions. During these surveys we recorded the location of all Dartford warblers and overlaid this data onto the digital habitat maps. This enabled us to visualise which habitat types were frequented by the warblers.

During our surveys we found Dartford warblers at seven locations, and six of these were confirmed as territories by the presence of a singing male or other breeding activity. The habitat maps showed that European gorse and bracken *Pteridium aquilinum* were the most abundant vegetation types over all of the sites. The majority of Dartford warbler sightings (94 %)

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Dartford warblers seem to show strong preferences for gorse habitats

occurred in gorse and, of these, 72% were in medium height gorse (0.5 to 1.5 m), which was more prevalent than shorter or taller gorse. It could be argued that the large proportion of Dartford warbler sightings within gorse might be due to that being so widely present here. However, the situation at one site (Rhossili) suggests this is unlikely. The site is dominated by bracken, yet every single Dartford warbler sighting occurred within the gorse.

Gorse bushes produce flowers at all seasons, providing food and shelter for invertebrates which in turn provide prey for the warblers all year round. The dense and spikey structure of gorse bushes provides shelter against harsh weather and also protection from predators such as foxes and sparrowhawks. Bracken on the other hand, is seasonal, supports a lower invertebrate biomass, and so provides less prey.

Complex pairings in the gorse

Although polygamy has not previously been confirmed for Dartford warblers, there have been observations of two males attending the same nest in the New Forest. It was uncertain whether this represented polyandry (a female with more than one mate) or whether one of the males was just a helper. In our Gower study it was noted that at one territory there were two males and at another there were two females. Considering this species is regarded as monogamous this seems unusual. Our observations suggest that polygyny (where two females breed with one male) may have occurred at the Oxwich

Hannah Meinertzhagen

Dartford warbler coastal heath habitat at Caswell, Gower

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Dartford warblers are now well established on Gower

territory, and polyandry (where two males breed with one female) could have occurred at the Limeslade territory. At Oxwich the two females had separate broods of different ages about 100m from each other within a continuous isolated stand of gorse. A single male was observed at this site on one occasion. Although polygyny has not been recorded for Dartford warblers, it is known among other warblers including Cetti's warbler, willow warbler *Phylloscopus trochilus* and great reed warbler *Acrocephalus arundinaceus*. In rich habitats supporting a wealth of prey, the occurrence of polygyny is more likely as a solitary female can successfully raise the young alone. Far fewer bird species exhibit polyandry, but when it does occur the productivity of the female is substantially improved, though the benefit to the males is less apparent.

Implications for management on Gower

Given the localised extent of the sites used in this study it would be dangerous to extrapolate the findings over a larger geographic area. However, this study provides baseline data for Gower which could be used to monitor both changes in the habitat at each site and how the Dartford warblers respond to this. It also raises the intriguing question of polygamy in this supposedly monogamous species, which would benefit from further research. This study suggests that the management of medium height gorse would be beneficial and bracken control is necessary. However, such management must also be balanced with the conservation of other important species and habitats, such as the calcareous grasslands which characterise the Gower Peninsula.

Hannah Meinertzhagen *graduated from Swansea University with BSc Zoology and MSc Environmental Biology and hopes to pursue a career in ornithology. Email: hannah.meinertzhagen@gmail.com*

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Telorion Dartford yng Nghymru

Rhywogaeth ardal Môr y Canoldir yw telor Dartford yn bennaf, sydd wedi bod yn ymestyn ei gynefin tua'r gogledd i gyfeiriad Prydain. Er mai ar hyd arfordir y de y mae'r aderyn hwn i'w gael yn bennaf yng Nghymru, mae wedi cael ei weld cyn belled â Phen Llŷn. Mae gaeafau oer yn effeithio'n arw arno, gan ei fod yn bwydo ar bryfed. Darganfu astudiaethau diweddar yn ardal Gŵyr nad yw'r rhywogaeth mor ffyddlon i'w phartneriaid ag y tybiwyd yn y gorffennol. Mae'r adar yn hoff iawn o rostiroedd sy'n llawn eithin, o bosibl gan eu bod yn blodeuo drwy gydol y flwyddyn a chan eu bod â phigau sy'n amddiffyn yr adar rhag ysglyfaethwyr. Gallai hyn fod â goblygiadau ar gyfer rheoli ardaloedd o'r fath.

Green **Bookshelf**

Rainbow Dust
Peter Marren
Square Peg 2015
308 pages, £14.99
hardback

A trio of books on Lepidoptera have taken wing this summer: Matthew Oates' obsessional pursuit of butterflies; Michael McCarthy's sobering reflections on the blizzards of moths we no longer encounter. The third, Peter Marren's *Rainbow Dust*, has given me the happy task of catching up on three centuries of delight in British butterflies.

In the introduction Marren makes clear that this book is personal. It is animated by his passion for butterflies, and perhaps also for words, and for history. He describes it as his attempt to write a 'cultural life' of butterflies to give a sense of their lasting appeal. It could be shelved under many headings – biography, history, memoir, social commentary, cultural and natural history.

An early chapter is called 'Chasing the Clouded Yellow'. It details Marren's childhood passion for butterfly collecting, and develops into a robust defence of the practice, although later he acknowledges that collectors failed to study the subjects of their obsession: "they were too busy pursuing specimens to watch patiently and try to understand what the butterfly was doing." The fate of most collections is vividly described in the bittersweet title: rainbow dust.

Mortality is ever present. The brief lives of butterflies have bled into art and imagination and spirituality. Three centuries ago, when human life was as uncertain before the forces of nature as a butterfly in a storm, these insects were credited with magical, sinister properties. Now they are symbols of loss.

An engaging gallery of butterfly enthusiasts is presented to us. These include pioneering women such as Elinor Glanville, deemed mad because she collected butterflies, but immortalised in the name of the Glanville Fritillary. Three centuries later he is able to write from personal knowledge of another remarkable lady whose hobby was 'watching butterflies' – Miriam Rothschild. He paints an affectionate Rothschild family portrait, with Ashton Wold, the 'overgrown' family home at its heart.

His first butterfly book is Frohawk's *The Complete Book of British Butterflies*. Frohawk's luck was in inverse proportion to his talent – publication of his books being undermined by two world wars. Richard Lewington is the modern day Frohawk, nicely conjured up, paints and lens at elbow, behind a large window looking out onto an Oxfordshire garden. We also meet the artist David Measures, who sought to let nature into his art.

The author's gift is to have opened a window on a group of fantastical insects, and generations of lives influenced by them. A short review cannot convey how much fact and feeling *Rainbow Dust* contains, but I am not only the butterfly enthusiast who will find rewards in this personal expedition into butterfly country.

James Robertson

Small Mammals and their signs
Mamaliaid Bychain a'u harwyddion
Amy-Jane Beer & Guy Troughton
Produced by Mammals in Sustainable Environment project 2015
Published by Natural Resources Wales
Available from rebecca.clews-roberts@cyfoethnaturiolcymru.gov.uk

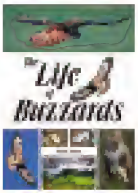
I am impressed with how much information there is in this small, pocket-sized booklet. To start with there is a small key to identify which mammal family best fits your observations. From there you can read in detail about individual species, including size and weight, habitat, sounds, behavioural traits, and 'spotter's tips'. Actual-size outline drawings of skulls will help identify any predated remains. It even describes the differences in droppings, including how to distinguish them from bat droppings, which I know to be useful as there can be some confusion.

The book is complete with excellent illustrations and photographs and there is a small ruler on each page to help with the identification. It is fully bilingual and lists some further reading and useful organisations should you wish to learn more. The pages are sturdy, rain-proof, and on a ring-binder so they can be easily turned.

The only minor downside to this book is that it does not have a small map showing distribution, which is understandable for some of the more common species, but for the less abundant, eg the harvest

mouse, it mentions "widespread but patchy distribution..." which isn't helpful in telling you where to look. Silhouettes showing comparative sizes might also have been useful. But overall this is very valuable little book, and easy to take out into the field to make correct identifications.

Rowan McShane



The Life of Buzzards
Peter Dare
Whittles Publishing
292 pages, £22.99 softback

Growing up in Wales, buzzards have always been part of my countryside, so when I moved to East Anglia as a student the gap in my daily life was evident: no mewing cry, no easy soaring on outstretched primaries.

Peter Dare's career has also taken him west to east, with an undiminished passion for buzzards. The introduction states that the book "is not intended to be a species monograph", but it is as close to that goal as I have yet read. It draws heavily on the author's own studies, but incorporates work by others from across the UK plus comparative research from Europe, particularly Germany and southern Sweden.

The first half of the book weaves the buzzard's story through a calendar year, focusing particularly on behaviour and diet. The remainder looks at territory, food, predation, population demography, and the decline and recovery of the species in Britain over the last 200 years. It tells the story clearly, with the detail sensibly contained in appendices – available, without interfering with the narrative.

The author's studies in Snowdonia and the Denbigh Moors provide useful comparisons to buzzard ecology elsewhere. A debt is owed to Julian Driver, who has continued the Snowdonia work to the present day, providing a combined dataset of almost 50 years. It is welcome to find observations by 'ordinary birders' used to support the science, from county bird reports, the internet and even BBC's Springwatch.

I learned much from this compendium: for example, that hovering by buzzards had not been documented in the UK prior to observations in Devon in the 1950s; that post-breeding defence 'attacks' on humans – beloved of the tabloid press – have been recorded since at least the 1920s; that there is no documented evidence of juvenile buzzards ever killing a bird or mammal.

Buzzards are proving highly adaptable to the huge changes in our farmed landscape. The eastern Britain to which they have returned in the last 20 years is very different to the one from which they were persecuted to local extinction from 1800. In the 1950s Myxomatosis reduced the rabbit population by more than 90%, interrupting the buzzard's recovery just as a century of persecution was reduced. Numbers of buzzards and their breeding productivity fell sharply in the immediate aftermath of the rabbit crash, but prey-switching, mainly to voles, enabled the start of a recovery in a few short years, though set back again in the 1960s by organochlorine pesticides used on crops and sheep dips.

The ending of the widespread use of poison targeted at foxes in the 1980s really accelerated the buzzard's recovery. Throughout Wales and southwest England, breeding densities are now close to maximum carrying capacity. This is a result of increased productivity and immigration by juveniles from farther west.

My niggles about the book were few, mostly presentational. There are some excellent photographs but the quality of some of the older landscape photos is variable, presumably reproduced from 35mm slides. There are plenty of graphs, but no consistency in their format, some are missing captions, and others too small to read easily.

But this should not take away from a very readable and informative book about our most abundant raptor, and a story of avian success in a human landscape that has not always made it easy to succeed.

Julian Hughes

A Bird Observatory is Born
Joan James
Published by Joan James, & Steven & Emma Stansfield
96 pages

With the sub-title *The Edited Diaries of the Bardsey Bird and Field Observatory 1953 to 1955* this is a fine celebration of those pioneering first years. Epic years in so many ways; such a contrast with today.

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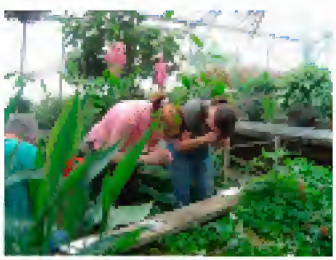
Denmark Farm Conservation Centre, Lampeter	
Introduction to Fungi	14-10-15
Habitat Restoration and Recreation	17-10-15
Centre for Alternative Technology, Machynlleth	
Understanding British Bats	18-09-15
Plant Diversity	25-09-15
Pond & Stream Invertebrates	02-10-15
Waterbird Identification	09-10-15
Gardening with Wildlife	09-10-15
National Trust Centre, Stackpole	
Wildlife Digital Photography	18-09-15
Plas Tan Y Bwlch, Gwynedd	
Permaculture 1	09-10-15
Aberystwyth University (non-intensive courses)	
Exploring Nature Through A Lens	10-10-15
Our Countryside Change & Community	16-10-15
Intro to Outdoor Digital Photography	31-10-15
Invertebrate Macrophotography	21-11-15

Check course dates at http://jump.aber.ac.uk/?qbcl



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Green **Bookshelf**

Not surprisingly, few who were involved then are still with us, but do include Penny Condry whose husband William, Bill to everyone who knew him, was the first Hon Secretary of the Bird Observatory. His article from the first report tells how a meeting in 1951 was followed by key folk visiting the island in 1952. Here they met Alan Till, a lighthouse keeper previously based on Skokholm, where he had been much influenced by Peter Conder the warden.

The following year an empty house was rented and on 4 July the first three residents arrived and the task of renovation and restoration began. The log records how 'As darkness fell the distinctive wailing and shrieking of hundreds of Manx Shearwaters coming in to land could be heard.' No finer sound to launch the new Observatory.

There was room for eight people who needed to bring their own food, everything else being provided for the modest charge of 3/6d a night. The boat crossing was on Saturdays, weather permitting – visitors to Bardsey well know the meaning of that phrase.

The diaries, the Observatory Logs, hand written by visitors, provide a marvellous insight into the first formative months, both of the natural history, but also the pioneering spirit. In 1953 the last visitor left on 9 October but Alan Till maintained the observations when his duties permitted, noting on 15 October that the island was a mass of birds and that the 26 water rail killed at the lighthouse had all been eaten by islanders and lighthouse personnel.

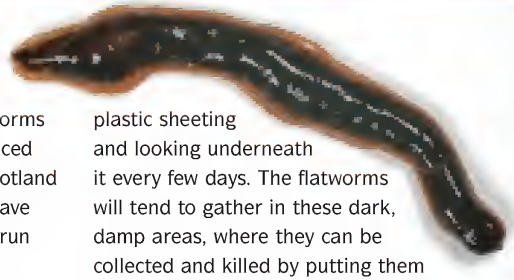
For 1954 and 1955 the Observatory logs are summarised in short monthly entries. A concluding chapter tells of Bardsey 2015, quite different in so many ways to 60 years ago. The book is profusely illustrated with many historic photographs, listed at the end, together with more recent ones by Steve Stansfield and illustrations by Emma Stansfield.

If you have not been to Bardsey you will surely wish to go and see for yourself after enjoying this book. Fortunately water rail will not be on the menu as the sweeping beams of the old light are no more.

David Saunders

Copies £12.50 inc. P&P from Joan James, 9 Nailsworth Road, Dorridge, Solihull B93 8NS. Cheques payable to Joan James. All proceeds support the Bird & Field Observatory.

Spread of the New Zealand Flatworm - a new citizen science survey



It is hard to be charmed by the New Zealand flatworm. Probably introduced to the UK on imported plant material, they were first recorded in the 1960s. Since then the slithery ribbon-like planarians have spread from Northern Ireland, through Scotland, and are now moving south into Northern England. They have been found near Bristol and so could move into Wales, where they would probably find the cool, wet and almost frost-free climate of Pembrokeshire very suitable.

The New Zealand flatworm *Arthurdendyus triangulates* is liver-coloured and has a pale yellow-beige marginal fringe with grey specks. It could be confused with the Australian flatworm *Australoplana sanguinea* which is abundant in south-west England and has also been found in Wales. This flatworm is orange or pinkish-orange and lacks the marginal fringe.

The New Zealand flatworms are predators of earthworms which they attack with a digestive slime, liquefying them in order to absorb what remains. Deep-burrowing earthworm species appear to be particularly vulnerable, and become scarce once the flatworms are established in an area. In Ireland, a long term experiment in 2012 showed numbers of lob earthworms *Lumbricus terrestris* were reduced by 75% on infested land. In Scotland some pastures with flatworm have become waterlogged and over-run with rushes with the virtual disappearance of earthworm and mole tunnels.

AC-NMW

New Zealand flatworm eggs

Tracking the invasion

As flatworms are often found in gardens, the Open Air Laboratory (OPAL) citizen science programme has created a New Zealand flatworm survey asking people to look for the flatworm in their gardens or local parks. Carrying out the survey is straightforward. Search an area for 10 minutes, focusing on dark, damp places like under pieces of wood, stones or plastic. If you find a flatworm do not handle it without gloves, as the digestive slime might irritate the skin. Submit a record, even if you did not find anything.

Stop the spread

The species is very difficult to eradicate once established, so gardeners with the pest must not pass on plant material. If you find the flatworm, try putting down plastic sheeting and looking underneath it every few days. The flatworms will tend to gather in these dark, damp areas, where they can be collected and killed by putting them in a container with very salty water. Vigilance is required for a long period though, as they can survive without food for up to a year by shrinking their body mass to 10% of their original weight. They can also withstand dry conditions by curling up like a Swiss roll. Eggs are produced by a sort of spontaneous caesarean every 10 days during the summer, and resemble half- size blackcurrants. These take about a month to hatch.

The University of Aberdeen and the James Hutton Institute are continuing to research the impact of its spread and the University of Aberdeen has led the development of the OPAL survey.

With thanks to Dr Anne-Marie Robinson at Aberdeen University and Dr Brian Boag at the James Hutton Institute.

Barbara Brown

A survey card with photos and identification features is available on the OPAL website along with further information about the survey and the flatworm itself: **www.opalexplorenature.org**. Alternatively, contact the Wales OPAL Community scientists below to help groups carry out the survey:

Bob Griffiths, COFNOD, Bangor:
bob.griffiths@cofnod.org.uk • 01248 672680

Iwan Edwards, North Wales Wildlife Trust, Mold:
IwanEdwards@wildlifetrustswales.org • 07584 311583

Barbara Brown, Museum of Wales, Cardiff:
barbara.brown@museumwales.ac.uk • 02920 573233

Islands round

This edition is devoted to Bardsey (Ynys Enlli) and (unusually) is largely about birds, in this case mostly just a single bird which was only the sixth record for Britain. It was a bunting, closely related to an ortolan, and it had probably wintered in Sudan or Eritrea. In June it should really have been somewhere like Turkey or Cyprus, but it was found on Bardsey by two North Wales birders, and once the news was out it soon attracted the attention of the twitching fraternity. This particular bird was a great attraction to twitchers, not least because Bardsey is easier to get to than places like Fair Isle where previous examples had turned up. Luckily it did not suffer the fate of another first for the island, a pied wheatear which arrived in October 2013 and was caught by a sparrowhawk later the same day. Island resident Ben Porter takes up the story below.

Ben Porter

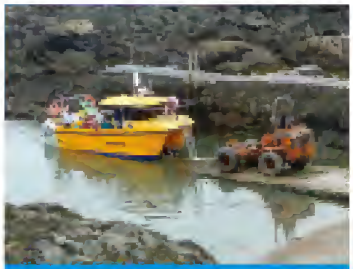
Cretzschmar's bunting *Emberiza caesia*

The crazy bunting

Just when we all thought that spring had come to an end, with the breeding season well underway and any significant arrivals of sub-Saharan migrants a thing of the past, the 10th of June produced a rarity of a magnitude that no-one could really believe. At around midday, two visiting birders (Elfyn Lewis and Ieuan Bryn) were wandering along the island's main track when a bird dropped down in front of them. Elfyn is from Porthmadog and had already made his name on Bardsey by finding the pod of four killer whales just off the island in June 2013. Realising the bird was clearly something unusual, Elfyn snapped a few images before the bird moved on, and was soon showing them to Steve Stansfield (Warden of Bardsey Lodge and Observatory). A glance at the photos suddenly sent pandemonium ringing over the island: it was a **Cretzschmar's bunting**! Wales's first ever record, and only the sixth in the UK. What followed was a tense search for this eastern gem, which ended on that first day with no further sightings. Despite the first twitchers making the journey to the island next day, there remained no sign of the bird. All was not lost, however. On the 12th the bunting miraculously reappeared – this time on the South End, from where it flew a wide circuit around the island before once again disappearing by late afternoon! Not a whiff of the bird on the 13th, but the following morning the bunting surprised us all; Steffan Walton (Assistant Warden at the Observatory), domiciled in the old Rescue Equipment storage barn right by the Lighthouse, was in for a surprise when he flushed the bird from his doormat! Thereafter, the bird remained faithful to a small patch of concrete inside the Lighthouse compound, where a thin covering of bird seed, regularly replenished, encouraged it to feed for around five minutes every hour. What followed from this fourth day was the largest twitch in Bardsey's history: a little shy of 500 birders

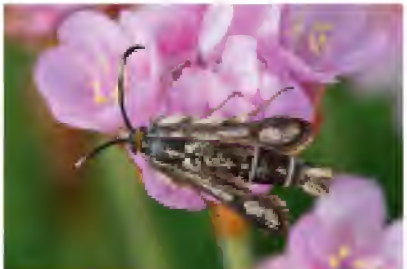
Cretzschmar's bunting *Emberiza caesia*

Ben Porter



Colin Evans and passengers arriving on Bardsey / Ynys Enlli

Geoff Gibbs



Thrift clearwing *Pyropteron muscaeformis*

Ben Porter

visited the island during the ten day period that the bird was present. Colin Evans (the boatman) had his work cut out ferrying boatloads of anxious birders ashore, whilst Observatory staff were kept on their feet (quite literally!) from 6 'til 6 every day. Their role was to ensure that visitors managed to connect with the bunting, and that all were well behaved (especially important on a small island with livestock and of course other holidaying visitors). The result was certainly a positive one, for all involved – a successful and very enjoyable event all round.

Other spring/early summer records

The late spring proved another good period for one of the island's scarce macro moths, the thrift clearwing. The adults (wingspan 15-18mm) can be seen visiting thrift and thyme flowers, while the caterpillars feed in the roots and crowns of thrift. Single-figure counts were noted around the coast during June, a few of which were seen by the bunting admirers. Also of note this spring was a very unseasonal shore lark – the first on the island since 1997 – which spent two days from 30th May feeding in arable fields in the NW corner. Shore larks breed on mountain tops in Scandinavia (very rarely in Scotland) and small numbers winter on the coast of East Anglia. The lucky observers on 30th May, their bags packed and ready to head for the boat, had a great treat.

Ben Porter and Geoff Gibbs.
Ben was home-educated on Ynys Enlli and is about to start a degree at Exeter University.

Shore Lark *Eremophila alpestris* Ehedydd y traeth

Ben Porter

Promoting spring forage

Steven Falk

Cow parsley in field margins

There is a current fashion for sowing summer-flowering wildflower seed mixes into farmland and urban green space for bees and other pollinators, and this is often seen as all you need to do to boost their numbers. Whilst there is little doubt that increasing the density and variety of flowers in summer can help, there is a general neglect of what pollinators require in spring months (March-May). The good news is that nature is often doing much of the hard work for you …

Spring flowering shrubs and trees

Hibernated bumblebee queens, mining bees, spring hoverflies and hibernated butterflies are most active in late March and April. A high proportion of the nectar and pollen available for them at this time comes from flowering shrubs and trees. There is very much a blossoming sequence that typically involves cherry-plum (March), goat willow (March into April), grey willow/blackthorn (April), wild cherry/crab apple/wild pear/larger willows (April into May), hawthorn/rowan (May) and dogwood/guelder-rose (late May into June). On farmland these blossoms will tend to be in hedges, alongside water courses and at woodland margins. By ensuring that you cut your hedges on a 3-year rotation, rather than annually, you can substantially increase the quantity of hedge blossom. But next spring, take a look at what is blossoming on your land and consider what additional shrub or tree species might fill in a time gap in the blossom sequence, or where it might be possible to let a little patch of blackthorn or sallow scrub to develop. That scrub can also create warm and sheltered sun traps which can be valuable to pollinators on cool, windy days.

Spring flowers

A relatively small number of flower species play a disproportionately big role, but they are often not species you might consider important and are often missing from wildflower seed mixes. Dandelions and white dead-nettle often produce fantastic blooms at arable margins during April, with dandelions often blooming across pasture too. Queen bumblebees love these flowers and there is a strong likelihood that they (together with blossoming shrubs) help dictate the number of bumblebee nests that become established, and therefore the number of workers that you see later in the year. Other weedy species such as speedwells, forget-me-nots, 'escaped' borage or rape, charlock, garlic mustard, comfreys, ground-ivy and daisy can also be really useful for a range of pollinators. In May, cow parsley and buttercups come into their own and serve a vast array of species – but don't cut them mid-flowering (something I see happen all too often).

Despite the large amount of guidance for seed mixes, there is surprisingly little published on the value of natural floras for pollinators. But don't despair. Set aside a little time next spring (maybe a weekly one-hour lunch-time walk) and simply look at what flowers are present in a given week, and what types of insects are visiting them. Your eyes, plus a general insect and flower guide, are the best tools for understanding how things work. You can continue that into the summer and compare what is visiting your sown wildflower area with the natural thistle, bramble, ragwort or hogweed patches nearby. Don't be surprised if you discover that the 'weeds' are just as popular as the sown wildflowers!

Conservation is about striking a balance between natural responses and managed ones. My simple message is give a bit more consideration of the former and not smother it out with the latter.

***Steven Falk,** Buglife Entomologist. Steven's new* Field Guide to the Bees of Great Britain and Ireland, *published by British Wildlife Publishing/Bloomsbury, is due out in November 2015.*

Save the Celtic rainforest

At the National Eisteddfod at Meifod in August 2015, Coed Cadw Woodland Trust launched a high profile campaign to save a rainforest – not the tropical rainforest, but a more temperate sort, created and sustained by consistent high rainfall in the hills of Meirionnydd.

Llennyrch is a 222 ha patchwork of ancient woodland, pasture and heathland at Llandecwyn in the Snowdonia National Park. It lies south of Coed Felinrhyd – a wood already in the care of the Trust – and adjoins two National Nature Reserves. The spectacular wooded gorge at Ceunant Llennyrch boasts more than 200 species of mosses and liverworts that thrive in the very humid conditions created by the Afon Prysor and its many waterfalls. With over 200 species of tree lichens, it is among the richest woodland lichen sites in Wales and is a vital part of the Meirionnydd Oakwoods Special Area of Conservation, a site of European importance for its extraordinary plantlife. Within the last year the lichen *Thelotrema petractoides* was discovered in Coed Felinrhyd, its only known site in Wales.

Llennyrch is not just a natural, wild environment. It's been farmed for centuries and the Trust wants this to continue. The hefted flock of sheep on the property, sheep that know their *cynefin*, are well adapted to this historic agricultural landscape, and light grazing is essential to maintain the conditions in which rare lichens and bryophytes can thrive. Our vision for the site is for a robust and regenerating woodland with scattered trees integrated across the landscape as part of a resilient mosaic of different habitats. If we are successful in purchasing the land we intend to work with the current farmer to demonstrate the many benefits of trees on farms, showing that productive farming and woodland conservation can go hand in hand. Iolo Williams, who spoke at the campaign launch, was particularly keen to stress this aspect of the mutual benefits of farming and conservation[1].

Green tourism

The Trust also intends to promote green tourism in Snowdonia by carefully opening up parts of the site for the public to enjoy, allowing access from the visitor centre at Llyn Trawsfynydd. This is an opportunity to marry conservation with good public access, so that people get to experience nature at its best.

The campaign to raise the necessary funds has already been kick-started with a contribution of £50,000 from Natural Resources Wales. The total cost will be £1.5 million, though, due to an extremely generous legacy, we only need to raise a portion of this. We do, however, need to raise £750,000 simply to secure the purchase, and we cannot do this without the generous help of our supporters.

The Woodland Trust has established a web page about Llennyrch, which can also be used to support the campaign, at **www.woodlandtrust.org.uk/rainforest**

Rory Francis

1. Iolo Williams and co-author Bethan Wyn Jones have recently written a book looking at the wildlife that thrives alongside livestock and crops on farmland in Wales. *Cynefin y Fferm*, pub. Gwasg Carreg Gwalch 2015.

Phil Formby

Alien Invaders on the Dee!

From its source in the Snowdonia mountains the River Dee stretches over 113km, cutting a meandering path through the picturesque north Wales countryside, over the border into England and through Chester before reaching Connah's Quay at the head of the shallow waters of the Dee estuary. This river basin system has a catchment of 1816km^2 and the estuary, the sixth largest in the UK, covers an area of 161km^2.

The area is a Special Area of Conservation and important for Atlantic salmon *Salmo salar,* sea trout *Salmo trutta*, European eel *Anguilla anguilla*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus* and otter *Lutra lutra*. However, all is not what it seems: below the tranquil waters the river is also home to the invasive Chinese mitten crab *Eriocheir sinensis*. Mitten crabs, named for their furry claws resembling mittens, are native to the east coast of China, and were first documented in Europe in 1912 in Germany, followed by solitary records in the Thames in 1935 and Humber in 1949. Further records of mitten crabs were recorded in the Thames in the 1970s, before a dramatic increase in numbers in the 1990s, possibly due to prolonged periods of dry weather.

Mitten crabs were first recorded in the River Dee in 2006 and records from the fish trap at Chester weir show that numbers are steadily increasing. Many invasive non-native species go through what is known as a 'lag phase', whereby species can be present in an environment for many years without having any discernable effects. The lag phase can last for decades (as seen on the Thames) before 'taking off' and potentially causing problems.

Chinese mitten crab *Eriocheir sinensis*

Impacts

Chinese mitten crabs are known to consume a variety of invertebrate prey, and they share similar ecological niches with a number of native species including the common shore crab *Carcinus maenas*. Predation on fish eggs could affect the year-strength class in later generations, and is a particular concern for salmon and trout populations on the Dee. Mitten crabs therefore have the potential to change the community structure of native ecosystems through competition and predation.

E. sinensis also poses significant economic threats. Freshwater and estuarine fisheries have reported damaged nets as the crabs are caught as by-catch, and recreational anglers have found that mitten crabs steal their bait. In addition, mitten crabs are a burrowing species, and densities of crabs can cause significant loss of sediment from the riverbanks through this burrowing action. This concern is intensified in waterways that are controlled by man-made levées, as any damage could create problems with floods and water supplies.

The Dee Chinese mitten crab project

The concern over potential ecological and economic impacts has led to management action to monitor this species in Wales. Natural Resources Wales (NRW) undertook a 2-year project

(2013–2015) in collaboration with the North Wales Wildlife Trust (NWWT) and Bangor University, in order to gain a better understanding of this species in the Dee. The project set out to:

- establish whether the Dee population is expanding
- explore various methodologies for monitoring and trapping mitten crabs
- examine the environmental cues driving migration.

The project also examined Pathways management, and awareness-raising with relevant stakeholders about the potential issues in the Dee catchment area.

The project conclusions highlight the difficulty of monitoring and controlling this species on the Dee. This relates primarily to the conservation importance of the area, which makes it difficult to implement effective trapping and mitigation strategies without negatively impacting features for which the river is designated. A large tidal influence and subsequent high river flow speeds also make for a challenging environment in which to set traps. The ecological and economic effects of this species were not investigated as part of the project, and none were discernibly detected. However, the Dee population is relatively small and most likely still in its 'lag phase' and it is expected that this could change in the future.

Please report any sightings of Chinese mitten crabs here: **http://mittencrabs.org.uk/**. This provides invaluable information for monitoring numbers and distribution.

Have you seen a Chinese mitten crab? Powerful claws – handle with care!

- **Grey-green to dark brown crab**
- **Long walking legs**
- **Squarish body up to 86mm across**
- **Dense brown 'fur' on the white-tipped claws (juveniles may lack this)**
- **Habitat: rivers, brackish water estuaries, rarely along the marine inshore coast**
- **4 + 4 + 4 pattern of teeth around front of shell**

Not to be confused with:

Common shore crab (*Carcinus maenas*)

- Lacks 'fur' on claws
- Shell shape more triangular
- Found on the sea shore and estruaries but never in freshwater rivers

The broad-clawed porcelain crab (*Porcellana platycheles*)

- Two long antennae
- Only three pairs of walking legs apparent
- Found on the sea shore but never in freshwater rivers

__Ben Wray__ is a Marine Biodiversity Ecologist with Natural Resources Wales. For more information on the project and details regarding the final report please contact: ben.wray@naturalresourceswales.gov.uk

A Welsh mycological revival

Like an emerging fungal fruiting body, bursting out of the ground after a late summer rain shower, mycology in Wales is bursting into life.

A meeting of 40 mycologists at the National Botanic Garden of Wales in May was evidence of the healthy mycelium threads coursing through south and west Wales. It brought together active members of the Pembrokeshire Fungus Recording Network, the re-born Glamorgan Fungus Group, and a nascent Carmarthenshire Fungus Group, as well as experienced mycologists from Ceredigion.

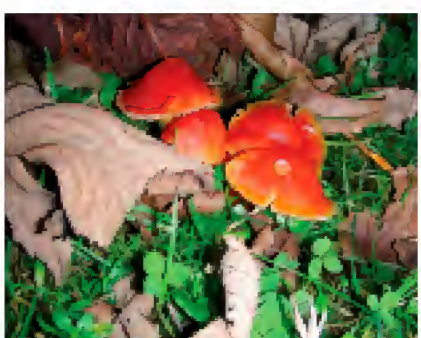
Lost and found

They met primarily to work out how to take part in 'Lost and Found', a new five-year project that encourages mycologists to look for fungi that have been recorded only rarely, or may even have been listed extinct in Britain. The event ended with the launch of the *Rust Fungus Red Data List and Census Catalogue for Wales* (see *Natur Cymru* 55, p44). This world-first publication of its type assesses the level of threat facing rust fungi in Wales so that priorities can be identified for conservation action. It draws attention to a vital but under-appreciated aspect of our ecosystem, and will be a valuable resource for monitoring and understanding rusts, some of which can wreak huge agricultural and horticultural damage. It will be interesting to see how the rest of the fungal world reacts to this Welsh initiative.

This meeting will become an annual springtime fungus forum, and next year's is likely to concentrate on coastal fungi. The Pembrokeshire group has recently published a useful identification booklet on sand dune fungi, while mycologist Shelley Evans has been busy assessing the mycological hotspots of Wales' coast. Add to this the large number of 'Lost and Found' fungi species associated with sand dunes, and the agenda is almost ready.

New research

There's plenty more evidence that Welsh mycology is beginning to flourish. We're now seeing Sites of Special Scientific Interest being designated specifically for their fungi. These tend to be sites rich in waxcaps *Hygrocybe spp.*, a spectacular group of colourful, wild mushrooms. Pioneering research to identify underground mycelium by their DNA 'fingerprint' will enable a hugely important breakthrough for field mycology, given the unpredictability of fruiting bodies. Cardiff and Swansea Universities are also undertaking exciting new mycological research.



Gaynor Ainscough

Waxcap *Hygrocybe sp*

Fungi common names

Many amateur mycologists have been delighted to see the development of English common names of fungi over the past 20 years. This not only makes it easier for budding new mycologists to remember names but it also helps people like me to communicate fungus-related stories to Garden visitors. The lack of Welsh common names is also being addressed. Cymdeithas Edward Llwyd has been publishing booklets on definitive Welsh language names for much our Welsh biodiversity over the past 10 years, and is due to publish a Welsh fungi list sometime in 2015.

The Garden is in the process of receiving and listing the library of one of Britain's most respected mycologists, Emeritus Professor Roy Watling of the Royal Botanic Garden Edinburgh. His large collection wonderfully complements our Stan Hughes mycological library, so that the Garden now has an increasingly good span across micro and macro fungi. Some of these books will feature in this year's Wales Fungus Day at the Garden on Sunday 11th October. This UK-wide event, which originated as a Garden initiative in 2011, featured more than 80 venues across the UK last year.

To find a UK Fungus Day event near you, visit **www.britmycolsoc.org.uk**

Bruce Langridge
Head of Interpretation, National Botanic Garden of Wales

Gwefan newydd – Natur Cymru – new website

Am sawl blwyddyn roedd ein hen wefan yn derbyn cymorth hael Cyngor Cefn Gwlad Cymru, ac yr ydym yn ddiolchgar tu hwnt am y gefnogaeth honno, ond bellach rydym wedi penderfynu mentro ymlaen ar ein liwt ein hunain!

Mae ein gwefan newydd yn cael ei datblygu ar hyn o bryd. Erbyn ichi ddechrau darllen hwn bydd yn bosibl gweld y tudalennau cyntaf. Byddwch yn amyneddgar tra byddwn yn cwblhau gweddill y safle, a chofiwch ddod yn ôl i weld sut mae pethau'n datblygu.

www.naturcymru.org.uk

Ar y wefan newydd bydd:

- Amlinelliad o gynnwys ein holl rifynau, o 2001
- Mynegai llawn o bynciau y gellir ei archwilio hyd at Rifyn 50
- Ein siop ar gyfer prynu tanysgrifiadau, copïau sengl a chloriau cadw, gan gynnwys unrhyw gynigion arbennig – y gobaith yw ychwanegu rhagor o gynhyrchion maes o law
- Adolygiadau o lyfrau sy'n cael sylw
- Newyddion a digwyddiadau
- Dolenni cyswllt â Natur Cymru ar ein blog, Facebook, YouTube a Twitter
- Dolenni cyswllt â'n cefnogwyr a sefydliadau defnyddiol
- Nifer dethol o hysbysebion – os ydych chi'n hysbysebwr cysylltwch â ni os hoffech gadw lle

Os oes unrhyw beth arall yr hoffech ei weld ar ein gwefan anfonwch eich awgrymiadau inni drwy e-bost.
info@naturcymru.org.uk

Gan obeithio eich gweld yno!

For many years our old website was generously supported by the Countryside Council for Wales, for which we are very grateful, but now we have decided to strike out on our own!

Our new site is under development. By the time you read this the first few pages will be available to view. Please bear with us while we build the rest of the site, and keep coming back to check how we're getting along.

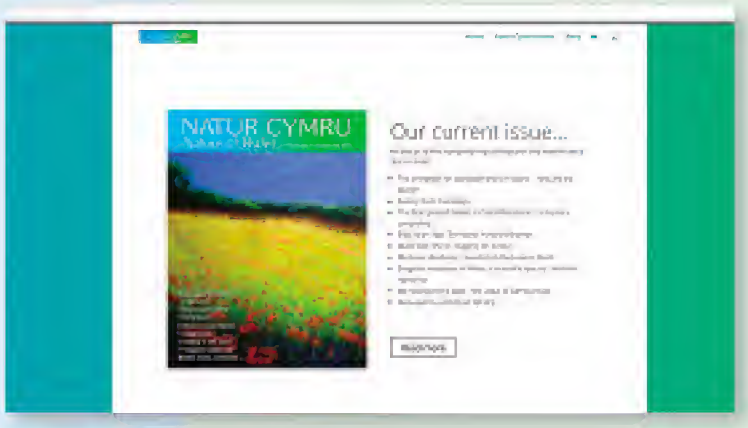
www.naturcymru.org.uk

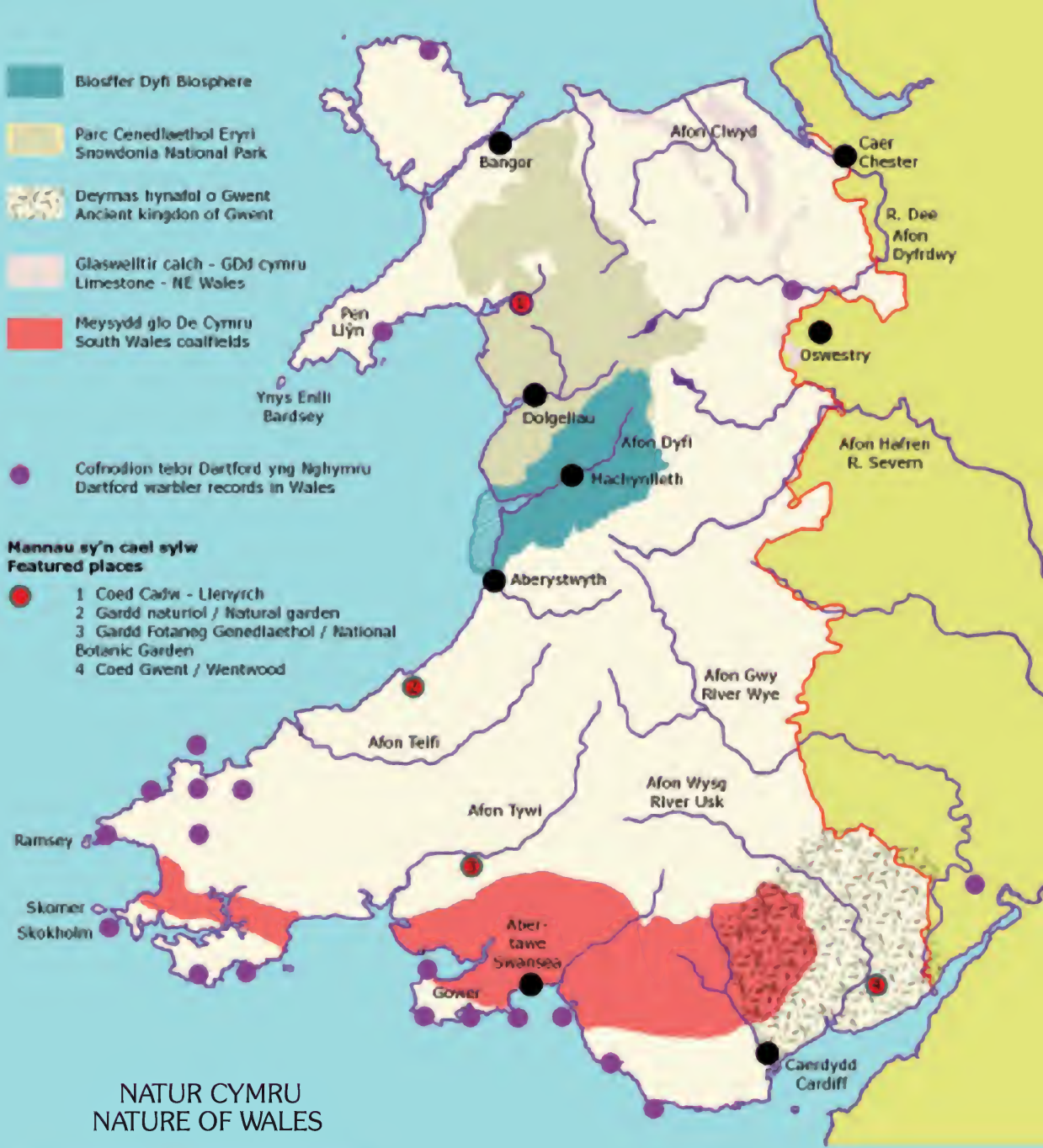
The new site will feature:

- Outline contents of all our issues, right from 2001
- A full searchable subject index up to Issue 50
- Our shop for buying subscriptions, single copies and binders, including any special offers – we hope to add more products in due course
- Featured book reviews
- News and events
- Links to Natur Cymru on our blog, Facebook, YouTube and Twitter
- Links to our supporters and useful organisations
- A select number of adverts – advertisers please get in touch if you'd like to reserve some space

If there's anything else you'd like to see on our site please let us have your suggestions by email.
info@naturcymru.org.uk

We hope to see you there!





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